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EDITORIAL NOTES—GAS, &c.

Gas Legislation—The Unifying Process.

THE Bills promoted by gas undertakings in Parliament, whether opposed or otherwise, in passing through the mill, undergo a great deal of revision. This, of course, is partly due to negotiations with local authorities, but largely to the careful examination and emendation to which the Bills are now subjected by the authorities of the two Houses. This latter fact should be comforting to local authorities, as it shows that technically, as distinguished from purely local and perhaps financial matters, their interests are in good hands. We commence to-day, in another part of the "JOURNAL," our customary review of the Gas Acts passed in the last session of Parliament. The Acts dealt with this week are those of new Companies, or of Companies who have been operating under Provisional Orders and have now attained the dignity of full statutory concerns, with increased responsibility and powers. All the Bills in this class went through, excepting the section of the Selsey Bill referring to gas supply; and this is not a matter over which there need be any regret. In fact, we should not have been sorry to have seen the complete rejection of the measure.

A special feature of the Acts under notice is the evidence they afford as to the intention of the authorities to correct, as far as possible, and as opportunity admits, the legislative chaos that has hitherto existed in gas supply, and so promote greater uniformity. In this, they will have the aid and sympathy of all whose endeavour it is to serve the best interests of the gas industry. It is to the advantage of the gas industry that, in matters where this is possible and applicable, there should be uniformity in legislative control, instead of one form of enactment for one place and one for another. What, for instance, is the use of having standards that have not universal application. Through the great range of illuminating powers in the olden days, a variety of flat-flame burners in some places, and a variety of argands in others, were the standards; so that, in those places where different testing-burners were established, and different standards of illuminating power obtained, the values attributed to the gas supplied had only an individual worth, and did not constitute any relative measure. Now we have a standard burner suitable for all gases up to 20-candle power, and that burner should be the "standard" not only nominally, but in reality by universal application, within its range. The authorities at Westminster are doing their part in making it so, notwithstanding a little futile opposition. But something more could be done to assist the authorities to quicken the pace. Appended to the testing clauses of most Gas Acts are words which pave the way to an application to the Board of Trade to allow of the adoption of any other test-burner that meets with their approval. The "Metropolitan" argand No. 2 burner does meet with the approval of the Board, as they recognize in it a standard that can be almost universally applied even in the present; and as the excessively high illuminating power gases descend in their standard, the qualification of "almost" applied above to the word "universally" will entirely disappear.

The parliamentary authorities have been made fully aware that the adoption of this comprehensive standard burner can be effected without any difficulty, and at comparatively small expense; and therefore they are bent—and very properly so—on bringing about uniformity in testing gas as opportunity allows. When the Bills whose provisions, in their recast and final form, are reviewed to-day were under notice at the beginning of the year, we were called to account from one quarter, for giving prominence to the fact that three Gas Bills—the Brockenhurst, the Bude, and the Selsey—specified for 14-candle gas the use of the "London" No. 1 argand burner, which was designed expressly for 16-candle gas, instead of the "Metropolitan" No. 2 burner. Having in mind the assigned motive of the protest that was made at the time by our correspondent—Mr. Charles E. Baker—his great regard for irreproachable dealing must have been seriously offended when, a few weeks later, the model clause specifying the "Metropolitan" No. 2 burner and the 10-candle pentane lamp was duly installed in the Brockenhurst and Bude Bills, and would doubtless have also found its way into the Selsey Bill had the gas section of it not suffered destruction. It is to the interest of all concerned in the Brockenhurst and Bude Companies that it should be as it is; and they have more to thank the authorities at Westminster for than those who advised them to have 14-candle gas tested by (for that quality of gas) a discredited and moribund system. In all the Acts noticed this week, the new model testing clause has been inserted; and promoters and their advisers should note the fact.

We are glad to see, too, that the old discounts clause, which restricted the commercial enterprise of the undertakings concerned, has been completely discarded in the Acts under notice. On Jan. 1 last, attention was called in these columns to the vague wording of a discounts clause in the Grays and Tilbury Bill. That clause has no existence in the Act; nor has the 10 and 15 per cent. clause in the Shanklin Gas Act. In these Acts, as in the others, all satisfaction is given to the parliamentary authorities, as had been announced in the model clauses it would do, by the extension of section 13 of the Gas-Works Clauses Act, 1847, with the words "provided also that every such con- "tract entered into by the Company shall be alike in terms "and amount, under like circumstances, to all consumers." There need be no more of the compulsory limitation in respect of discounts that existed in prior sessions; and the action of any gas administrations who may in future seek to deprive themselves of the freedom enjoyed by their competitors in commercial negotiation will be stamped as an absurdity.

Upon general matters. The amount of capital for which authority was sought in these Bills was mostly moderate. Where it was so, the figures have passed without challenge, or have been agreed as fair. In certain instances, there have been reductions, doubtless in a case or two to placate the local authorities. In noticing the Bills, however, attention was drawn by us to the amount of capital asked for by the Grays and Tilbury Company; and we see by the Act that the additional capital of £136,000 desired by them has been diminished by £50,000. Still it is well in promoting a Bill to ask for sufficient, having regard to prospective wants; for, however modest the amount, there is always the risk that the local authorities will make an effort to have it reduced. Their views are not always the views of prudence. Only at the recent meeting of the West Ham Gas Company, the Chairman mentioned that at the rate the Company were spending capital to meet the expansion of their business, they would be obliged to be in Parliament again in 1909 or 1910. That will be only seven or eight years from the date of the Company's last Act, during the progress of which through Parliament their opponents contended that the capital sought would enable the Company to keep out of Parliament for some twenty years! It is also observed in the Acts that the standard price has been cut down in a few instances; but, in the case of Companies applying for Acts for the first time, this modification of the standard price is not the same thing as disturbing, without compensating benefit, all that depends upon the maintenance of the standard price of an already existing statutory company. In one case (Bude) the maximum price of 5s. has been altered, since the introduction of the Bill, to a standard price of 4s., with sliding-scale as to dividend. Another notable feature is that, in the Bude Bill, a 21 years' purchase clause has been inserted. In the interests of the undertaking and of the consumers, a purchase clause operating for such a length of time ought not to have been permitted; for the uncertainty created by it

can only have a crippling influence, in regard both to administration and the obtaining of capital. In the Llandrindod Wells Act, too, there is a purchase clause; but that is on the lines of electrical legislation, and can only be put into operation within six months after the lapse of 21 years. So that the Company will have a certain 21 years' lease of life, and then within six months will learn whether or not they are to continue or terminate their existence. The clause was inserted to satisfy the District Council, as was also one which pledges the Company not at any time "to supply gas "containing carburetted water gas or Dowson gas, without "the consent in writing of the Council under their common "seal." The Boston Spa and Shanklin Companies did not carry through the clauses authorizing them to make application for Electric Lighting Provisional Orders.

The Eastern Counties Meeting.

THE members of the Eastern Counties Gas Managers' Association crossed what is fairly their geographical boundary last Thursday, and met at Gravesend. Good excuse for the little trespass lay in the one fact that the President for the year, who has been for some time actively engaged in the work of the Association, is Mr. Joseph Davis, the Engineer of the Gravesend Gas Company. The meeting will be one of happy recollections; for the Chairman (Mr. M. A. Troughton) and Directors of the Company came to the aid of their Engineer, not only by bounty as hosts but by personal interest throughout the day. But it is to technical impressions and proceedings that we have here to devote ourselves; and, from that point of view, the first thing to be said is that the gas affairs of Gravesend have mixed with them causes for congratulation and causes for sympathy. The former are comprised in the headway the Gas Company have made in business, despite—and herein is one of the causes in the second category—the competition of an electricity undertaking that is being run without any consideration for the interests of the ratepayers, and that has in consequence a very bad record. The policy followed is the electricity undertaking first, the common good of the borough second, and the Gas Company—large ratepayers, and long supporters and loyal servants of the borough——well, the consideration for them is brought down to the irreducible minimum. This is not as things should be. Ratepayers of Gravesend should insist on the electricity undertaking being treated on purely commercial lines, and not as something to be petted and favoured at all costs; and then let it abide by the results. It should be rated at its proper amount; and the street lighting and the lighting of the municipal buildings should be made a matter of fair competition in price and efficiency, having consideration for the needs of the borough. There has been loss to the borough and no profit from the working of the undertaking; there has been an increased cost in respect of public lighting; and the undertaking has been rated on the lines of absurdity, to the detriment of every other undertaking and ratepayer in the borough. To the losses on the undertaking, to the increased cost of the public lighting, and to the deficiency in rate-payment produced by the low assessment of the concern, the Gas Company as large ratepayers have had to contribute. They have had to pay dearly for the maintenance of their own competitor. That is not just; and the ratepayers should see, by thorough investigation, why these things have existence; and whether they accord with the predications made previous to the establishment of the concern. Perhaps the ratepayers will find, as a result of inquiry, that this electricity business is one requiring in its management an amount of technical as well as commercial skill, so that there shall be no going or leading astray. Just recently the Corporation were within an ace of being involved in an extension that could only have landed the ratepayers in a worse state—bad as that is—than the one they have hitherto occupied, and still occupy. It would be interesting to learn how it was they became involved in such a muddle, and who it was who advised them to go so close to the brink of further trouble before warning came.

Notwithstanding this unfair competition during the past five years, the Gravesend Gas Company have, in the quinquennium, added 11 million cubic feet of gas to their output, despite their deprivation of the sale of some 10 million cubic feet for public lighting purposes. So that really, for those five years, they have standing to their credit new business, from sources other than public lighting, equal to 21 million feet. There we have a cause for congratulation. But, of course, this increased business could not have been obtained without an increased expenditure of capital; and here the Gravesend Company are representative of those concerns that cannot possibly, for at any rate a period, hope to augment their business without an advance in the average amount of capital per million cubic feet of output. The Company's opportunities are not limitless; and their policy in the present must be to secure as much business as possible by the reasonable spending of capital in the distribution department, and afterwards keeping their hold on the business—meanwhile devoting themselves to expending, as occasion allows, money on the works in such manner as to assist in lowering costs of production. It was seen on the works, for example, that the carbonization plant could not with truth be described as modern; but this is due entirely to the adverse subterranean conditions, which have made Mr. Davis's experiments, even with shallow regenerators, a failure. But he has not lost heart, and is going to further experiment until he succeeds in finding a way to modernize—and "modernize" is here the synonym for economy—the settings before reconstruction is again imperative. We refer to these matters as they are typical of those that contract the technical and commercial bounds of several undertakings, and distinguish their conditions, to their disadvantage, from those of other concerns.

Besides local questions, the President indulged in a general review of subjects that are uppermost in thought in the gas profession at the present time. He is a strong adherent to the cause of Commercial Sections in connection with District Associations; and he urged upon the members generally to "press home" to their Boards and Committees the value of such sections. His counsel is to be supported. At the same time, it is all very well to advise gas managers in this way; but it is commonly known that the slow progress made by these Commercial Sections in getting adherents is due more to the impregnable wall of conservatism built round Directors and Committees who desire to work out their own commercial salvation without outside aid, than to any want of appreciation of value or of eloquent advocacy on the part of their chief executive official. While on the subject of these sections, one matter raised at the meeting might very well come under their consideration. It is found in the opposing experiences of the President and Mr. Thomas Glover in the use of carburetted water-gas tar for roadways. At Gravesend there has been a trial with water-gas tar; and the odour was so intolerable that the use of the tar had to be discontinued. On the other hand, Mr. Glover spoke most favourably of its employment, which he accentuated by saying that the whole of the stock of water-gas tar at his works had gone on to the Norwich roadways this summer. In the interests of dealings in water-gas tar, the reason for this difference in experience should be uncovered. Still one other matter was raised—this time by Mr. John Carter—which can very properly be tackled by the Commercial Sections of the Association, perhaps working in conjunction with those of the other district organizations. That is an inquiry into the question of the allowance for depreciation in the case of gas undertakings when being assessed for income-tax. As Mr. Carter truly declares, this is a question around which there is at present some disorder. But it is one of immense and growing importance, as is shown by the last report of the Commissioners of Inland Revenue, which puts the gross income assessed in respect of gas-works for 1905-6 at £7,413,611—an increase in a decade of £1,884,155, or 34 per cent.

The President appeared to be very much impressed with the harmony of the experience, in all quarters, in the use of retort governors; and the advantages are indeed such as to be beyond dispute. The members of the Association may take pride in the fact that interest in the use of retort governors was largely aroused by the paper read by Mr. Thomas Glover before the members in 1904; but it must not be overlooked that Mr. Glover himself was indebted for his interest in the matter to what had been done at the works of the South Metropolitan Gas Company, and notably by Mr. Charles Carpenter. Touching upon carbonization, there are a couple of points in the President's address, which, small though they are, should, for the sake of historical accuracy, be corrected. He reviewed briefly the position of the vertical retort trials; and, in doing so, he stated that an installation of the Young and Glover system had already been made at St. Helens, and that the Dessau system was introduced by Herr Körting. While the preparations are advanced, and work is in hand, for the installation of the Young and Glover system at St. Helens, the

setting or settings has or have not yet been built; and as to the Dessau system, Herr Körting (though largely concerned in the development) would not desire that the honour due to Dr. Bueb and to Herr von Oechaelhauser for introducing the system should be diverted from them to himself by any misapprehension. From these references to the various technical matters before the members on Thursday, it will be seen that in it interest abounded.

Discontented "Coalite" Shareholders.

THE radiance which the fluency of speech of Mr. A. G. Kitching threw over the prospects of the British Coalite Company, Limited, has not had a long existence. His humorous remarks as to the decadence of the "profession" of chimney sweep in consequence of the arrival of "Coalite" have been found by shareholders to be second-hand, the origin having been a real complaint by chimney sweeps as to the effect the progress of gas cooking and heating has had upon their fortunes; and his gibes at "Little Carbo" are now regarded as mere bluff intended, if only temporarily, to belittle in the eyes of the shareholders a strong opponent. But now that some of the shareholders have looked into the subject-matter of Mr. Kitching's address at the recent statutory meeting, and seen how really superficial it all is, dissatisfaction with the prospects of the Company is spreading, and there are doubts now as to whether the three-quarters of a million of money has not been sunk profitlessly or almost so. There is rumour that some of those gentlemen who were a few months ago, before the prospectus was issued, sedulously propagating the virtues of "Coalite" to gaping pressmen without any claim to technical knowledge, and who were responsible for the puff advertisement articles in the daily papers, betook themselves rather hastily from the scene of their labours with their remuneration, and at once sought pastures new. "Coalite," we fancy, will no more know certain of those individuals. What was bagged by them, it may be opined from the evidences, did not come up to expectations.

According to the "Daily Chronicle," a "Coalite Share-"holders' Defence Committee" has been formed; and that Committee have issued a circular "in which serious allega-"tions are made regarding the promotion and formation of "the Company, and its prospects are set forth in a most "dubious light." Shareholders are advised to get into communication with this Committee, and see whether there is in what they have to say anything more substantial than the vague statements and commonplace wit of the Chairman. It might even now be worth while to cut losses than to have part in any excesses of pure speculation. For that is all the Coalite business is. One thing that the shareholders have to bear particularly in mind is that the substance known as "Coalite" can be made by systems of carbonization other than the one owned by the Company; in other words, the Company have not the monopoly of the ways and means of producing the material. In establishing a business, too, the Company are dependent upon the goodwill of gas undertakings in purchasing the gas they produce; and this gas undertakings are not showing any disposition to do. The Company will be exposed to the competition of gas undertakings in all ways, even in a substance equal to "Coalite," if there is profit in it. Several gas undertakings have already been asked by coal merchants whether they will be prepared to supply the material if there is a sufficient demand, and at a price below that at which the Coalite Company can supply. As to price, let it not be forgotten by the shareholders that there is a gas-works in every town where the material can be turned out, with no charge for conveyance except from works to consumer's door; whereas the "Coalite" Company will only have works dotted here and there about the country, and so the cost of carriage will be against them in the competition. It is the competition of a Company having three-quarters of a million of capital with an industry having in its statutory undertakings about 125 millions of capital. And Mr. Kitching speaks of the gas industry fearing the Company's competition! There are interest and amusement sometimes in hearing and watching a little egotist.

New President of the Society of British Gas Industries.

"The Council of the Society of British Gas Industries have much pleasure in announcing that Sir George Livesey has accepted the Presidency of the Society for next year." Thus runs the brief announcement received from the Secretary of the Society (Mr. Arthur L. Griffith) at the end of last week. In having secured Sir George as the successor in the presidency of Mr. Dugald Clerk, the Society are to be very heartily congratulated. It is a further, though unneeded, evidence of the broadness of spirit with which Sir George views the common interests of the gas industry. When the Society was in embryo, there were those in the industry who openly expressed themselves as being unable to countenance its formation. Those engaged in the manufacture of gas plant and appliances, albeit forming an integral part of the industry, were in the eyes of certain persons as the pariahs of Hindostan, and had no right to assume they could in any way—by co-operation or otherwise—have any useful existence in the industry beyond the pale of their own private business. Sir George has never, to the best of our knowledge, held any such view. If we understand, and we believe we do understand, the principles that animate him, he holds in every man, in every body of men, doing what is legitimately best to serve the most useful of ends. And his acceptance of the presidency of the Society is the best tribute that he could give the members of wishing the Society well, and of encouraging the members in their desire as a body to serve the gas industry, and to strengthen the common bond. We believe there are now about sixty firms—not sixty individuals—represented in the membership of the Society, and that constitutes a body of no mean influence. The Council of the Institution of Gas Engineers have found the Society all that it was claimed they would find it to be—a channel through which valuable work might, by united endeavour on the part of plant and appliance manufacturers and the engineering profession, be accomplished. To this the late President of the Institution (Mr. Charles Hunt) certified in his address last June. "In," he said, "the development of these [the uses to which gas may be applied] the various makers of gas appliances have very laudably responded to the demand which has been fostered. It is but justice to acknowledge the value of their co-operation, which it is to be hoped may increase in effectiveness, as one of the results to be anticipated from the new organization—the Society of British Gas Industries. This has already been the means of bringing together in friendly conference, on matters of common interest, representatives of various sections of the industry."

Gas Heating—A Hint for the Council of the Institution.

We do not desire at the moment to comment on the general points raised by the correspondence that has been proceeding in the "JOURNAL" on the subject of gas heating, as it is hoped that others will give their views on the many interesting features that have been named. But there is a suggestion in the letter of "Radiation" published to-day to which we would at once ask the particular notice and sympathetic consideration of the Council of the Institution of Gas Engineers. It is passing strange that much as the success of gas in lighting, heating, and other uses is bound up with the work of the architect, that architects and gas engineers have never, through their organizations, held a conference over those matters which are of mutual importance. The work of the one through improper provision, and the work of the other in trying to fit square things into round holes, and to accommodate things where it was never destined that they should be accommodated, produce some most lamentable incongruities. Our correspondent's suggestion, in brief, is that this should go on no longer—that the Council of the Institution should invite the architectural organizations to a conference on the matter, at which papers might be read and discussed. It would not be a bad thing, too, to take the Society of British Gas Industries into counsel, as then all three interests would be represented—the architects, the suppliers of gas, and the makers of the means of use. There is no doubt that to unsuitability of position for the general run of gas-fire designs, without going to some expense in effecting the installation, often weighs down the balance in favour of the retention of coal as the heating agent when a householder has under consideration the *pros* and *cons* of gas heating. Our correspondent goes farther. The Institution have now an inquiry in hand referring to the hygienic and heating efficiency of gas-fires. The object of the inquiry is to bring about improvement to the advantage of the gas-heating business. But the discussion that has been proceeding in our columns has projected into consideration other matters—such as this one of conference with the architectural organizations and that of differential prices; and our correspondent asks why should not the Council of the Institution commission their Special Committee to extend investigation into

all the matters raised, and which surround this important subject. We commend the suggestions of our correspondent to the Council, as we can see no reason why—opportune as they are—they should not be acted upon.

A Timely Contradiction.

Perhaps too often, when refutation would be easy, are statements made by the self-constituted champions of Labour allowed to pass unchallenged, no doubt owing to its being taken for granted that their inaccuracy or incompleteness will be readily perceived by all who may happen to peruse them. Instances are, however, occasionally seen in which the cudgels are taken up with effect by some opponent who has put himself to the trouble of ascertaining the real facts in connection with some matter that has formed the basis of particularly extraordinary assertion. Such a case has occurred in connection with a letter to the "Standard," written by Mr. "Jack" Williams, who has secured for himself a reputation as an orator at socialistic gatherings. In this communication, Mr. Williams joined in a discussion on "What Socialism means;" and one of his points was that, "when analyzed, capital only resolves itself into unpaid labour." He said that, in return for his wage, the worker produced as much wealth as he could in the form of commodities, which were placed upon the market and turned into money. This money return to the capitalist, on the average, amounted to more than four times the sum paid in wages, besides including the value of the plant and raw material absorbed in the production of the commodities. In reply to subsequent criticisms, Mr. Williams returned to the charge, with the idea of substantiating his asserions; and he quoted as an example of the "exploitation of the workers" a statement by Mr. Will Thorne, M.P., the Secretary of the Gas Workers and General Labourers' Union, that for the six months ending last December the wages paid by the Gaslight and Coke Company amounted to £104,984, the salaries to £64,760, and the shareholders' profits to £561,209. Adding the first two items together, said Mr. Williams, and comparing the total with the third, it would be found that the workers were exploited at the rate of about 350 per cent. for the benefit of the shareholders, leaving out of account high salaries for officials. What could be more simple—providing the premises are correct? But in this particular instance that unfortunately happened not to be the case, as has since been clearly demonstrated by another correspondent, the portion of whose letter to the "Standard" which deals with this point is reproduced in our news columns to-day. The writer (Mr. C. de Broë) showed that the figure that had been quoted for wages was only about one-third of the estimated amount paid (which was not less than £303,471), while the amount put down as shareholders' profits was a great deal more than was actually distributed among the ordinary shareholders (£334,468). In the light of these figures, the "350 per cent." will assume a very different aspect. Curiously enough, at about the same time that this last letter appeared, Sir Christopher Furness, M.P., speaking at the meeting of the Broomhill Collieries, dealt with the same point as affecting the miners and coalowners. An analysis of the Company's balance-sheet for the past year, he said, showed that out of every £100 realized for coal labour received directly in money 52·44 per cent., and indirectly in rates, coal, rent, &c., 7·46 per cent.; while the remuneration to capital (after allowing for cost of materials, rates and taxes, royalties, and depreciation) was only 10·51 per cent. Taking the actual cost of production—that is, money expended in raising coal, exclusive of reserve for depreciation and remuneration to capital—labour receives 75·87 per cent. These figures, he pointed out, did not bear out the contention that capital was overpaid, even in a good year such as that to which they related; and for four years the ordinary shareholders received nothing.

We are informed that at the last meeting of gas-stove manufacturers it was unanimously decided not to make presents of any kind whatever at the forthcoming Christmas season.

In a recent number of the "Revue Scientifique," Dr. C. Féry gave a short illustrated account of new methods of determining high temperatures in industrial operations. For temperatures up to 700° C. he recommends a thermo-electric couple of iron-constantan; and from that to 1300° C. one of platinum and its alloys—in each case in combination with a self-registering arrangement. Where the thermo-couple would be injured if brought into direct contact with the source of heat, he advocates the use of his own pyrometer, in which the radiation from the source is concentrated by a concave mirror on to the thermo-junction.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 47.)

Business on the Stock Exchange last week was naturally quiet, and the tendency was irregular from time to time. Taking one day with another, the aspect on the whole was fairly cheerful. There were factors good and bad—the state of the Copper Market heading the latter; while the Anglo-Russian agreement was a conspicuously favourable item. Things on the opening day were not good. The copper influence was felt; the American Market was powerfully affected; and others drooped in sympathy. Movements next day were sluggish, but a little better. Some small buying in choice lines was apparent, which had a steadying effect. Wednesday was more cheerful altogether. There was greater activity; buying for investment progressed; and prices in many departments (including Home Railways) made a moderate advance. On Thursday, the tendency was not so steadily in the upward direction; but some amount of investment purchasing was still in action. Friday suffered as usual from sales to realize profits; but the better quality of stocks managed to keep their prices well up in spite of it. Things were uneven on Saturday; the gilt-edged division holding on, but more speculative lines being weaker. During the week, Consols moved slightly up and down, but closed unchanged at the opening figures. In the Money Market, there was an increasing demand as the close of the quarter approached, and rates became harder; but discount terms were fairly easy. Business in the Gas Market was quite up to the seasonable average, and the general tendency was steady. In Gaslight and Coke issues, the ordinary was quite active and commanded rather higher prices; but the quotation was left unaltered. In the earlier portion of the week, 94 was marked once or twice; but 95 was more than once attained before the close. In the secured issues, the maximum changed hands at from 86 to 87½; and the debenture at 82½. The preference was not dealt in. South Metropolitan was about the same as the week before; prices ranging from 119 to 120¼. The debenture was done at from 81½ to 82½. In Commercials, there was very quiet business in the 4 per cent. at 102 and 103, and in the 3½ per cent. at 99¼. Very little was done in the Suburban and Provincial group. Brighton ordinary marked 155½ and 156 *ex div.*, British 41, South Suburban 114⅝ and 115 (a fall of 1), and West Ham debenture 100. In the Continental Companies, Union was unusually active, and showed transactions ranging from 113⅛ to 115 in the ordinary, and 139½ and 140 in the preference. Imperial was quiet at close figures between 175 and 176, European fully-paid marked 22¾, and ditto part-paid 18¼. Tuscan was done at 10½. Among the undertakings of the remoter world, there was most activity in Argentines. Buenos Ayres changed hands at 11⅛, ditto debenture at from 93 to 93¾, Primitiva at 6⅞ and 7, ditto preference at 5 and 5 1/16, ditto debenture at 94½ and 95, River Plate at from 13¼ to 13⅝, and Melbourne 5 per cent. at 102.

ELECTRIC LIGHTING MEMORANDA.

Over-Straining Resources to Secure Business—The Case of West Ham—Power and Lighting Prices and the Increase in the Respective Branches of Business—Another Example of Electrical Literature for Home Consumption.

In the spasmodic efforts made by municipal purveyors of electricity to build up a better financial condition of affairs, they sometimes over-strain themselves, and with painful results. This conclusion was arrived at in looking recently into last year's accounts of a number of municipal electricity undertakings (*ante* p. 620). In calculating the cost of making reductions in the price of electricity, there does not seem in all cases to be sufficient thought taken for the morrow, nor regard paid to the capacity of a district for absorbing the additional quantity of electricity that must be sold to render full compensation for the revenue yielded to the consumers in the shape of reduction in price. Several cases might be taken to illustrate this; but we will content ourselves by referring to the single instance of the West Ham Corporation Electricity Department. During the last financial year, we gather that the maximum rates were adopted of 3d. per unit for lighting, add 1d. for power and traction. Those were the rates for ordinary consumption; for we notice that the average prices obtained during the year were for private lighting 2·7d. per unit, for power 0·95d., and for traction 1d.; while public lighting yielded an average of 1·39d. per unit. We understand from a statement by the Electrical Engineer (Mr. A. Hugh Seabrook) that these reductions represent an amount of £9500. This is a big sum; and it wants some further explanation, as, on the authority of the Borough Treasurer, the "total income" of the undertaking for the year showed an increase of only £1952, and yet the deficiency on the year's working was only £1829. This is not accounted for by any diminution of working expenses or capital charges, for the total working expenses advanced by £4483, mainly in respect of coal, repairs and maintenance of motors and public lamps, while capital charges were augmented by £2152. So that we have this peculiar condition of affairs that, while the department gave up in reductions £9500, while working expenses increased by £4483, while capital charges were augmented by £2152, the income only

expanded by £1952, but the deficiency was merely £1829. Well there appears something a bit mysterious about the figures; and unless Mr. Seabrook will explain how he has managed to take upon his shoulders all these extra burdens, and come out with such a small—small in view of the circumstances—deficiency, it must remain a mystery to us. But the deficiency of £1829 is not the only bad point in the year's financial position. Last financial year started with the insignificant sum to the credit of the reserve fund (insignificant for a concern with the capital of this one) of £4352. But poor as the reserve fund was, it has been charged with the net cost to date of changing over a 600-kw. set to two-phase, as well as with the outstanding debt over and above the proceeds from the sale of a 300-kw. set—leaving a balance to the fund of only £1658. Therefore the deficiency on the year's trading was £1829, and the reserve fund showed an amount to its credit of £200 less than this amount. It might also be noted by the ratepayers that electricity for public lighting last year cost them £500 more than the year before—that is to say, £6547, against £6047. And that lighting the Gas Company could have done well at less cost. Rates and taxes only amounted to £174; while the total capital expenditure was £385,610!

For the ratepayers, therefore, the financial position of the concern cannot be a gratifying one; and it may be submitted that the figures show that the reduction in price was prematurely made, having regard to the amount that Mr. Seabrook states those reductions represent, having regard too to the fact that the Committee must have been able to determine that coal would cost them for the year approximately an additional sum of £2580, and that the capital charges would be increased by something like £2152. It is quite clear that the reductions were made with an inexact knowledge as to, or an inflated notion of, the capacity of the district for responding to the business-boosting work of the department. It was estimated that if (that "if" ought to be printed in capitals) the sales during 1906-7 could be increased by 900,000 units for lighting, and 1,000,000 units for power, the increased revenue would balance "the small cost" of the production of the additional units. Now let us see how far actual result conformed with estimate. There were 1,925,410 units sold for lighting against 1,796,195 units during the preceding year. That is to say, the increase was 129,215 units, which shows that the estimate of 900,000 units had nothing whatever to justify it, and was nothing better than a hopeless wish. Then as to power, the sale was 1,357,456 units, compared with 604,900 units in the previous year—the increase being 752,556, which also fell short of the estimate by a quarter of a million units. The tramways produced the best result in consumption, with 3,801,853 units, against 2,779,301 units; and for heating, 7891 units were sold, compared with 3011 units. From these figures it will be seen that the greatest increase in business was going on during the year in electricity at 1d. per unit, but the increase in business in electricity at 3d. per unit was sluggish indeed. Stated another way, with working expenses and capital charges mounting up, the greatest increase in private business was being done in power consumption at an average price of 0·95d.! Besides this the Borough Treasurer tells us that the repairs and maintenance of motors are, next to coal, responsible for the increase in working expenses, though, on the other hand, there has been an increase in the revenue from motor hire and work executed for consumers. But in view of the fact that the greatest increase in business is in the motor, or lowest-priced electricity, branch, there ought, before it goes too far, to be a strict inquiry as to what are the likely effects of this trend of affairs upon the fortunes of the undertaking.

Mr. Seabrook's remarks, in his report, upon the development of the business, are of interest. He states that, although the private consumer received the largest reduction, he is the most difficult to induce to take up the use of electricity. The reduction in price to the private consumer for lighting was made from March 31, 1906; and, in spite of "persistent advertising and canvassing, there was an actual decrease in units sold during the two following quarters, compared with the corresponding quarters of the previous year, amounting to 70,000 units, *showing how firmly had the change set in against electric lighting*." This confession is extremely interesting. But to continue: "An increase took place in the third quarter, and a larger increase in the fourth quarter; but it came too late to have much effect on the year's revenue, which was over £3000 below the previous year. The price of current for power purposes was not reduced until June 30, 1906; and the increased output obtained of 752,556 units is satisfactory, though it was 300,000 units *below the figure considered necessary to make the reduced price pay*." The increased revenue from power was £2200. It is clear from these remarks that Mr. Seabrook is fully aware that the increased power business did not pay its way during the year; and therefore, with such an augmentation of the business, it indicates to what a point has the price been cut to get this business, and yet the costs for coal, repairs, and maintenance are creeping up steadily. However, up to the time of his report, the sales of current for private purposes had increased by 100 per cent. (apparently compared with the corresponding period of last year). But here, again, he says: "There is a far greater increase in units for power than for lighting"—that is to say, a far larger increase in the low-priced electricity than in the higher priced electricity for lighting. At this rate, the power business—conditions being somewhat more favourable than in many districts—bids fair to completely swamp the lighting business. Whence, financially, is this leading?

In his report, Mr. Seabrook also made some remarks, anent the uselessness of spasmodic and periodical advertising in whipping up business, and as to the necessity of the advertising being systematic, persistent, and thorough. We agree with him But much depends on the character of the advertising as to whether it will attract, or commend itself to, the householder. We have had to call attention on more than one occasion to statements in electrical literature prepared for public consumption that were, and we deliberately say it, untrue. Many of the pamphlets, too, produced by local electrical engineers are really, through the puerile and inane character of the contents, an insult to the intelligence of householders in their districts. One such pamphlet we have just been reading. Its author is Mr. Napier Prentice, the Engineer and Secretary of the Felixtowe Electricity Supply Company. He writes vaguely of all sorts of matters, insinuating that gas is guilty of producing ill-health, and stating that, *when* gas is let into air, the "impurities" in it are poisonous. "When" let into the air! So the householder may assume that the impurities are not poisonous when in the gas-pipes; and that is where in the house coal gas is expected to be kept until it is consumed. "Gas," he also says, on the authority of that partizan Sir William Preece, "when burned in the bedroom is as injurious as bad water and bad smells." Why in the bedroom, any more than in any other place? Are there any gas consumers alive now in Felixstowe who have burned gas in their bedrooms? If so, they evidently ought not to be, according to the Electrical Engineer. And if so, too, Mr. Prentice had better take his rubbishy nonsense to some town, if he can find one, where the people are not blessed with common intelligence. He further asserts that cooking can only be properly done by electricity or high-pressure steam. Many gas consumers in Felixstowe know better. We wonder whether Mr. Prentice has ever enjoyed the dinners served at noted hotels and restaurants in the West-end of London, where gaseous fuel obtains, and the chefs would not be without it, owing to its reliability and ease of control—a reliability that cannot be claimed by electricity. Perhaps, too, Mr. Prentice is not aware that the last returns showed over 600,000 hired gas cooking-stoves in use in the areas of the three London Gas Companies. He talks of the "heat" of the electric radiator. Defend us from the cheerless electric radiator on a severely cold day, and give us the heat and radiance of the gas-fire. He speaks further of electric flat-irons and foot-warmers; of their dangers, we were writing last week. All that he says on these matters is general—very general. He advances nothing in the way of material fact in support of the points to which we have referred.

On two other points, however, Mr. Prentice does. He supplies no figures as to the comparative cost of gas and electric lighting; he will give them in the secret of his office where they cannot be combated by people who know. But he does say that there are contractors in Felixstowe willing to carry out wiring at from 7s. 6d. to 15s. for each point of supply, and that fittings can be obtained at from 5s. apiece and "upwards." Therefore, if a man wants in his house fifteen to twenty points of electric lighting he has to pay for installation fifteen to twenty times the costs mentioned by Mr. Prentice, according to the character of the work required. To the sum thus arrived at there must be added the cost of the fittings at each point of lighting, the cost of which fittings are generally not 5s. but "upwards;" and on to this there has to be placed the renewal of lamps—say, about three at each point of lighting per annum. Things are not altogether quite as they are pictured by Mr. Prentice. Further and craftily, he tells the readers of his pamphlet that the official return of the causes of fires in London last year puts down 100 to defective electric circuits and 415 as caused by gas. He has not the frankness to also tell the Felixstowe people, as bearing upon these figures, that (as stated in our recently issued "Illuminating Truths" leaflets) a generous estimate of the number of electricity consumers supplied by the 31 electricity undertakings in London is 80,000; and that, within a smaller area of supply, the three London Gas Companies alone supply nearly 900,000 consumers, among whom, as already stated, there are in use (not counting privately owned stoves) upwards of 600,000 hired gas cooking-stoves, without reckoning gas-fires, engines, and other uses of gas. The electrical fires in London in 1906 averaged one to every 760 electricity consumers, and the gas fires one to every 2220 consumers. What has Mr. Prentice to say to this? We shall be curious to hear. Before the householders of Felixstowe accept his statements, it would be well to hear the other side.

Fuel from Towns' Refuse.—Mr. H. G. Coales, Assoc.M.Inst.C.E., the Town Surveyor of Market Harborough, has invented a new fuel made from refuse, and has named it "Coalesine fuel." It is composed of pulverized ashbin and trade refuse, with an admixture of tar, or tar and pitch, pressed into briquettes or cakes, or handled in bulk. Mr. Coales argues that the refuse must be pulverized, because ashbin refuse in its crude state is offensive and untidy, and unless it is pulverized the tar cannot be thoroughly incorporated with it. During the process of pulverization, he says, the tar can be concurrently mixed with the refuse; and when pulverized the refuse is reduced in bulk and more easily handled. The resultant fuel can then be pressed into briquettes or cakes. Coalesine fuel is stated to be not in the least offensive—the deodorizing effect of the tar being quite effectual; and the fuel may be stored in confined situations without causing nuisance.

GAS ACTS FOR 1907.

COMPLETE prints of the Gas Acts for the past session are now before us; and a *résumé* of their provisions may be given—leaving out of consideration all matters that are common to present-day legislation, and noticing only those features that have special or current interest. We will lead off with Companies that have been incorporated, and granted statutory powers for the first time.

The Annfield Plain and District Gas Act brings into existence, with the necessary authority, a Company who will supply gas in Annfield Plain and Tanfield, in the county of Durham. The history of the gas supply (such as it was) of the district preceding the application last session for powers was traced in noticing the Bill in the "JOURNAL" for Jan. 1 last. As to the defined limits of supply, the powers of the Shotley Bridge and Consett District Gas Company to supply gas within portions of the township of Collierley are repealed. The capital proposed in the Bill has been reduced from £45,000, with one-third borrowing powers, to £36,000, carrying one-third borrowing powers. The standard dividend is 7 per cent.; and the standard price of gas has been curtailed by 3d. since the Bill was introduced—making it 4s. The sliding-scale is to operate half-yearly; penny changes in price carrying 1s. 9d. per cent. variations in dividend. For prepayment meter supply, the modern clauses as to excess price have been applied. Insurance, reserve, and renewals funds are provided for. The purchase by the Company of the gas-works and property from the owners (Mr. W. A. Schultz and Mr. Charles Comins) is governed by certain provisions. The purchase price is to be the total of the actual sums paid by the owners for the lands, gas-works, and property; and the actual costs and out-of-pocket expenses incident to the acquisition, together with the fair value of all the works executed by the owners since the acquisition—the purchase price to be settled by a single arbitrator (to be appointed, within three months of the passing of the Act, by the President of the Institution of Gas Engineers), in accordance with the provisions of the Lands Clauses Acts, without any allowance for compulsory purchase. The Annfield Plain District Council are to have a month's notice of, and are secured the right to be present at, the proceedings before the arbitrator, and are to be allowed to examine all books and papers relating to the subject-matters before the arbitrator. The services of the same arbitrator may also be required in another matter. Messrs. James Joicey and Co., Limited, have protecting clauses, one of which provides for the gas-mains, pipes, and apparatus belonging to the firm passing into the possession of the Company at a price to be settled by agreement or arbitration. Messrs. Joicey and Co. are also to be compensated for the loss incurred by ceasing to supply some forty houses with gas. The Company are authorized to purchase (in addition to the scheduled land) up to 5 acres of land by agreement. The illuminating power of the gas is to be not less than 14 candles; and in testing it the modern system—the use of the "Metropolitan" No. 2 burner, bar photometer, and Harcourt 10-candle pentane burner—is to obtain. [*Parliamentary Agents: Messrs. Lees and Butterworth.*]

The Boston Spa Gas Company have in their Act set their affairs in order, so that they start afresh with a clean slate and extended powers. Matters of historical interest were referred to when the Bill was under notice. The preamble has undergone a little modification. As was mentioned when reviewing the Bill, the Limited Company had had a structural valuation made of their works; and it was found that it was £8300. This sum has been reduced to £7500. It was thought reasonable that, various sums of money having been spent out of the profits of the undertaking on the improvement of the works, £2000 of ordinary stock should be created and distributed rateably among the shareholders of the Limited Company. This £2000 has been shorn of £800. The Act defines the limits of supply, but provides that the Company shall not supply in any part of the parish of Bramham-with-Oglethorpe without the previous written consent of the Bramham Gas Company, Limited. The powers of the Tadcaster and Wetherby Gas Order, 1883, are abrogated so far as they relate to Thorp Arch and Walton. The capital of the Company is to be £12,000, whereof £5200 is to be the original capital, and £6800 the additional capital. The holders of the shares in the Limited Company are to receive £130 of original stock in respect of every £100 held by them. These amounts have undergone alterations in view of the reduction of the structural valuation; hence the smaller amount to be distributed *pro ratâ* among the old shareholders. The former figures were £6000 each for original and additional capital, with a distribution of £150 per cent. of stock held by the shareholders. On £4000 of the original stock a dividend at the rate of 10 per cent. is to be paid; but on the £1200 balance (representing the amount spent out of profits) only 5 per cent. is to be paid. On the additional capital, the dividends are to be 7 per cent. on the ordinary stock and 6 per cent. on the preference. Inclusive of £2300 already borrowed, the Company may borrow up to one-third of the amount of the issued capital. Reserve, insurance, and renewals funds are authorized. New issues of stock may be offered to consumers or employees on the conditions that have become customary. By agreement, the Company are authorized to purchase up to 10 acres of additional lands. Quite a batch of provisions have been introduced for the protection respectively of the West Riding County Council, the Wetherby District Council, and the Wetherby Water Company. The sliding-scale has undergone a change during the passage of the Bill, in respect of the rate of increase or decrease of dividend. The standard price is to be 4s. 11d. per 1000 cubic feet; and the variations of dividend for penny changes of price are to be in respect of any year 5s. per cent. on the 10 per cent. capital and 3s. 6d. on the 7 per cent. capital. The illuminating power of the gas is to be 14 candles, and the modern testing conditions apply. The Company have not carried through the clause proposing to authorize them to apply for an Electric Lighting Provisional Order. [*Parliamentary Agents: Messrs. Baker and Co.*]

The Brockenhurst Gas Company obtain all the capital that they asked for—viz., £15,000, with £5000 borrowing powers. With regard to the £5000 borrowing powers, there is an alternative—"they may borrow from time to time not exceeding £1000 in respect of each portion of capital not exceeding £3000 issued." In the end, the alternative amounts to the same thing as the total or ordinary borrowing power. In addition to scheduled lands, the Company may purchase by agreement up to 5 acres for general purposes. The maximum price of gas is to be 5s. for 14-candle gas, tested by the up-to-date methods of the "Metropolitan" No. 2 burner, and the Harcourt 10-candle pentane lamp. The Southampton County Council and the London and South-Western Railway Company have been granted certain protecting clauses. [*Parliamentary Agents: Messrs. Baker and Co.*]

Regarding the Bude Gas Company's Act, the capital powers secured amount to £8500, which is a drop of £6500 between the stages of promotion and Royal Assent; one-third borrowing powers being also granted. Supplementing the lands described in the schedule to the Act, the Company are allowed to purchase up to 5 acres by agreement. Protecting clauses have been inserted in the Act in favour of the District Council, the London and South-Western Railway Company, and the County Council of Cornwall. A maximum price of 5s. per 1000 cubic feet of gas was originally in the measure; a standard price of 4s. has displaced it, with a 5s. per cent. increase or decrease of dividend in a year for, as the case may be, a reduction or advance in the price of gas by 1d. The illuminating power of the gas is to be 14 candles, tested on the most modern lines. The price to be charged by the Company for gas supplied for public lighting is not to exceed a rate equal to the price charged to private consumers, less 20 per cent. The Stratton and Bude Council have secured the insertion of a purchase clause operative for 21 years. [*Parliamentary Agents: Messrs. Baker and Co.*]

In the Grays and Tilbury Gas Act, there appears much to which attention was drawn in reviewing the Bill on Jan. 1 last. Suffice it now to say that the capital sought has dropped (by £50,000) to £150,000, made up of £10,000 "A" ordinary capital, £54,000 of "B" ordinary, and £86,000 additional. This last figure was £136,000 in the Bill. Including the £14,275 already borrowed, the Company have permission to borrow up to one-third of the issued capital. The standard rates of dividend are to be 10 per cent. on the "A" capital, 7 per cent. on the "B" capital, and not exceeding 5 per cent. (6 per cent. was named in the Bill) on the preference capital. Insurance, reserve, and renewals funds are provided for. The standard price is to be 4s. 4d. per 1000 cubic feet for gas supplied in places situated within the urban district of Grays Thurrock, or within a circle having for its centre the Company's gas-works, and for its radius 1 mile, and 4s. 10d. for gas supplied to all other portions of the limits defined in the Act. The respective prices in the Bill were 5s. and 6s.; so that the concessions are 8d. and 1s. 2d. Operating half-yearly, the sliding-scale provides for 2s. 6d. and 1s. 9d. variations of dividend respectively on the 10 and 7 per cent. capital with penny changes in price. The illuminating power of the gas is to be 14 candles, tested by the "Metropolitan" No. 2 burner and the 10-candle pentane lamp. Regarding the testing-place, it is provided that the Council may (in substitution for the ordinary testing-place at the works) provide, on a site situate within 880 yards of the works, a building suitable for a testing-station—the Company providing the necessary apparatus. The Company are empowered to purchase, in addition to the scheduled lands, 10 acres by agreement. The Grays Thurrock District Council, the Grays Chalk Quarries Company, Limited, the South Essex Water-Works Company, and the Thames Conservators have all been granted certain protecting clauses in the Act. [*Parliamentary Agents: Messrs. Baxter and Co.*]

The Llandrindod Wells Gas Act confirms the proposal of the new Company that the capital shall be £15,000, with one-third borrowing powers. Reserve and renewals funds are permitted. Lands are scheduled for works; and purchase by agreement up to a further 5 acres is sanctioned. The District Council and the London and North-Western Railway Company have provisions in the Act giving them certain protection. The maximum price of gas is to be 4s. 6d. per 1000 cubic feet; and the prepayment meter clauses for excess charges are incorporated. The maximum charge for the hire of any meter other than a prepayment one is to be at the rate of 15 per cent. per annum on the cost of the meter. The illuminating power of the gas is to be 14 candles, using the "Metropolitan" No. 2 burner and the Harcourt 10-candle pentane lamp. A short, but in its effect decisive, clause now appears whereby it is made unlawful for the Company "at any time to supply gas containing carburetted water gas or Dowson gas, without the consent, in writing, of the Council under their common seal." The District Council have also secured the insertion of clauses providing for the purchase of the works, if within six months after the expiration of a period of 21 years from

the passing of the Act, the Council serve notice on the Company. [*Parliamentary Agents: Messrs. Lees and Butterworth.*]

The Shanklin Gas Company have secured a comprehensive Act. After defining the limits of the area of supply, it is provided that if at any time after the expiration of three years from the commencement of the Act, the Company are not affording, or prepared within six months after receiving a demand in writing to afford, a supply of gas to the part of the parish of Wroxall, or any other part of the Isle of Wight, included in the limits of supply, the local authority of the district or any other Company may apply for an Act or a Provisional Order to provide a supply. The capital of the Company is to consist of £66,000 consolidated ordinary stock, bearing a standard rate of dividend of 5 per cent. per annum, whereof £34,000 is to be divided rateably among the shareholders (£20,000 among the holders of the 2000 £5 shares entitled to a dividend of 10 per cent., and £14,000 among the holders of 2000 £5 shares entitled to a dividend of 7 per cent.), and the balance of £32,000 is to be the additional capital. Inclusive of the sum of £5000 already borrowed, the Company are allowed to borrow one-third part of the nominal amount of the consolidated ordinary stock and one-third of the issued additional capital. Insurance, renewal, and reserve funds are to be provided for. Permission is given to purchase up to 5 acres of land by agreement. Within a radius of 6 furlongs from the principal entrance of the gas-works, the standard price of gas is to be 4s. 6d. per 1000 cubic feet, and within all other portions of the limits of supply 5s. per 1000 cubic feet. The standard dividend being 5 per cent., dividends may advance or recede half-yearly by 1s. 3d. per cent. for penny reductions or increase in price. The illuminating power of the gas is to be 14 candles, tested under the new conditions. The desire of the Company for sanction to an application for an Electric Lighting Order has been wiped out; but in the Act the Isle of Wight Rural District Council have obtained a clause enacting that wherever gas mains, pipes, or services are laid in, under, or by the side of, any road or highway, the trench excavated shall be filled up level with the original surface of the road with a layer of fresh clean broken gravel or other approved material on the top not less than 6 inches thick; and in all cases where the subsoil is clay or boggy ground, with a layer of chalk or rough stone not less than 6 inches thick immediately below the layer of gravel. [*Parliamentary Agents: Messrs. Torr and Co.*]

CONCILIATION (TRADE DISPUTES) ACT.

Eleven years ago—in 1896—there was passed an Act "to make better provision for the prevention and settlement of trade disputes," which is known as the Conciliation (Trade Disputes) Act; and this, at intervals of two years, is the subject of a report by the Board of Trade on proceedings that have taken place under it. One of these documents—the sixth of the series—covering the period from July 1, 1905, to June 30, 1907, was issued last week; and it conveys the welcome intelligence that progress (slow, perhaps, but gratifying nevertheless) is being made in the direction of the amicable settlement of industrial disputes.

The Act is a very short one, the working provisions being contained in four sections; and, before noticing the report which is before us, it may be as well to briefly indicate the main features of the Statute. The first section provides for the registration of such Conciliation Boards as are constituted for the purpose of settling disputes between employers or workmen, and for the furnishing by them to the Board of Trade of such returns, reports of proceedings, or other documents as may be required. In the next are set forth the powers which may be exercised by the Board of Trade, where a difference exists or is apprehended between an employer, or any class of employers, and workmen, or between different classes of workmen. After inquiring into the causes and circumstances of the difference, the Board may: (1) Take such steps as may seem expedient to them for the purpose of enabling the parties to meet, by themselves or their representatives, under the presidency of a chairman mutually agreed upon or nominated by the Board of Trade or by some other person or body, with a view to the amicable settlement of the difference; (2) on the application of employers or workmen interested, and after taking into consideration the existence and adequacy of means available for conciliation in the district or trade and the circumstances of the case, appoint a person or persons to act as Conciliator or as a Board of Conciliation; (3) on the application of both parties to the difference, appoint an Arbitrator. The third section stipulates that the Arbitration Act, 1889, shall not apply to the settlement by arbitration of any difference or dispute to which the present Act applies; but any such arbitration proceedings shall be conducted in accordance with such of the provisions of the said Act, or such of the regulations of any Conciliation Board, or under such other rules or regulations, as may be mutually agreed upon between the parties. The fourth and last section to which it is necessary to refer provides that if it appears to the Board of Trade that in any district or trade adequate means do not exist of having disputes submitted to a Conciliation Board for the district or trade, they may appoint any person or persons to inquire into the conditions of the district or trade, and to confer with the employers and employed; and (if the Board of Trade think fit) with any local authority or body, as to the expediency of establishing a Conciliation Board for the district or trade.

To return to the report referring to the past two years' working of the Act, it may be mentioned that the total number of cases dealt with in this period was 51; while the number settled under the Act was 45. These figures show a substantial advance on any of the results chronicled in preceding reports. The total number of cases dealt with in the period from July, 1903, to June, 1905, was only 27, and the number settled under the Act 24; while the corresponding figures for the preceding two years were 41 and 29, and for the two years before that 46 and 29. It is noteworthy that of the 51 cases alluded to in the report under review, no less than 23 occurred in the six months from January to June, 1907; while between the end of June and August 10 additional cases were dealt with under the Statute. The total number of cases between August, 1896, when the Act came into force, and June 30 of this year was 232; and of these, 168 (or 72 per cent. of the cases dealt with) were settled under the Act. The action of the Board of Trade is taken on the application of one or other, or both, of the parties to a dispute; and of the 232 instances just named, there were joint applications in 140 cases, applications from workpeople only in 60, and from employers only in 22. The proportions, however, vary in different periods; and while in the earlier years of the operation of the Act applications for the intervention of the Board of Trade came mainly from one side only—and this generally the workpeople—the great majority of those made in the last six or seven years have been joint applications, either from the parties themselves or from organizations directly representing them. The number of cases of joint application in the two years now under review was 46, or no less than 90 per cent. of the total dealt with.

The report—which bears the signature of Mr. A. Wilson Fox, of the Commercial, Labour, and Statistical Department of the Board of Trade—does not deal with the work of the registered or unregistered Conciliation Boards; and thus, of course, it does not form a complete record of what is nowadays accomplished by conciliation as opposed to force. It merely sets forth those instances in which the services of the Board of Trade have been sought with a view to the settlement of differences which had already reached a more or less acute stage. As a matter of fact, in 16 out of the 51 cases now reported upon, there was an actual stoppage of work. As to the trades whose disputes formed the subject of the intervention of the Board of Trade, 14 cases were in connection with building, 13 in the boot and shoe trade, 7 in the metal, engineering, and shipbuilding trades, 7 in the printing and allied trades, 4 in mining and quarrying, and 6 in other trades. Since the Act was passed, the building trades have been well ahead as regards the number of cases in which the assistance of the Board of Trade has been sought; but other trades have not held the relative positions they do in the present report. The most important cases dealt with in the past two years were the Nottingham lace trade and the music hall disputes.

Reverting to the Conciliation Boards, it may be mentioned that, during the past two years, no addition was made to the number registered under the Act. There are, however, at the present time known to be 209 registered and unregistered Boards in existence. The rules of the Conciliation Boards and the agreements observed by the employers and workpeople in the various trades in (so far as the Board of Trade are aware) 60 cases contain a clause providing that, in the event of the Conciliation Board, or other agency, failing to effect a settlement of any dispute, application shall be made to the Board of Trade for the appointment of an Arbitrator, Umpire, or Conciliator. The agreements containing this clause include those between the Gas and Electric Light Fittings Employers' Association of Birmingham and the National Society of Amalgamated Brass Workers; the Master Brassfounders' Association of Birmingham and the same Society; the Water, Steam, and Beer Fittings Masters' Association of Birmingham and the same Society; the British Mannesmann Tube Company, Limited, and the National Union of Gas Workers, &c.; and the Huddersfield Corporation and the Amalgamated Association of Tramway and Vehicle Workers. The clause relating to the matter in the agreement between the Birmingham Gas and Electric Light Fittings Makers and the Brass Foundry Workers is as follows: "Should the two Secretaries declare a question contentious, only an equal number shall take part in the voting. Any matter which cannot be amicably settled by the Board, shall be referred to the Board of Trade to be dealt with under the Conciliation Act, 1896." The clause in the rules of the Huddersfield Corporation Tramways Conciliation Board reads: "The Board shall elect as their President an independent person outside their body; but failing election by the unanimous votes of the Board, the Board of Trade shall be asked to nominate a President. Such nomination, however, shall be subject to confirmation by a majority of the Board."

Scottish Junior Gas Association (Eastern District).—We learn from the Hon. Secretary (Mr. John R. Moyes) that the annual meeting of the Eastern District Section of the Association will be held next Saturday afternoon, in the Heriot-Watt College, Edinburgh. The business will consist of a few remarks by the retiring President (Mr. W. Brown, of Lasswade), the presentation of the financial statement and the report of the Secretary, the election of office-bearers, and the Inaugural Address of the new President, Mr. David Bisset, of Edinburgh.

THE ILLUMINATING POWER, IN ORDINARY AND INCANDESCENT BURNERS, OF COAL GAS, WATER GAS, AND MIXTURES OF THE TWO GASES.

By Emile Sainte-Claire Deville.

[Abridged Translation, with Comments, by W. J. Atkinson Butterfield, M.A., F.I.C., of a Communication presented to the Meeting of the International Photometric Committee in Zurich, July 18 to 20.—Continued from Sept. 24, p. 832.]

Third Memorandum (Dated Jan. 20, 1906.)

THE ILLUMINATING POWER IN ORDINARY AND INCANDESCENT BURNERS OF COAL GAS, WATER GAS, AND MIXTURES OF THOSE TWO GASES, BOTH WITH AND WITHOUT ENRICHMENT BY BENZOL.

Section I.—Definitions.

The ordinary illuminating power, determined by the (Parisian) official method of Dumas and Regnault, as well as the so-called "absolute" illuminating power, as defined in Section II. of the First Memorandum* will be ascertained in the tests about to be recorded. For the determination of the absolute illuminating power, a Sugg ("London") argand burner provided with means for regulating the air supply according to the consumption of gas and measuring it, has been used. The absolute illuminating power is expressed in terms of the minimum consumption of gas required to afford in this burner a light of one carcel (9·8 candles), when the air supply to the burner is so regulated that it is impossible to alter it either way without causing a reduction in the intensity of the flame.

In default of any generally accepted definition of the illuminating power of a gas in incandescent lighting, two definitions will be followed—one representing the customary, the other the absolute, illuminating power in incandescent burners. For determining the customary illuminating power, an ordinary burner of No. 2 pattern, provided with a well-shaped and perfect mantle, is taken, and the gas to be tested is burnt in it under a pressure of 70 millimetres (27½-10ths); while the inflow of air at the base of the bunsen tube is so regulated by means of the metal ring that the absolute intensity of the light appears to be the highest attainable. Under these conditions, the intensity (I) is ascertained, and the rate of consumption (G) is observed, The calorific power (C) of the gas being known, the heat expended is G × C. Then there are found by calculation: (1) The illuminating duty in candles per cubic foot and (2) the duty in terms of heat expended—*i.e.*, number of B.Th.U. per candle. The "customary" illuminating power of a gas in incandescent burners therefore is that of which a consumer could avail himself who should be competent to manipulate the air controlling ring to the best advantage, but unable to change the gas-nipple.

The object of determining the customary duty was to prove if the substitution of mixed gas for neat coal gas would be attended by immediate trouble in the behaviour of ordinary burners as actually regulated. If it proved to be so, the fitters would have to adapt the burners to the new gas—say, by enlarging the gas-nipples. [It must be remembered that water gas has hitherto only been made to a relatively small extent in French gas-works, and that problems relating to its use in admixture with coal gas with which most English gas engineers are familiar, have not yet come practically before many of their French colleagues.]

The absolute illuminating power of a gas in incandescent burners was defined in the second memorandum as the maximum illuminating duty in candles per cubic foot, or in B.Th.U. per candle, with a mantle of settled dimensions, under vigorous combustion, when the burner is supplied with air through a meter in the same way as the gas. The mantle adopted for the present testings has been the No. 1 "Lumen" brand. Such a test takes it for granted that the superiority of a gas under vigorous combustion is a measure of its value under the customary combustion as generally utilized.

The variations of the four "illuminating powers" which have just been defined have been investigated in the following three cases—viz.: (1) Simple or uncarburetted water gas compared with water gas carburetted with benzol; (2) neat coal gas compared with the same gas to which water gas has been added; (3) the last-named mixed gas compared with the same mixed gas carburetted with benzol.

Section II.—Simple Water Gas Compared with that Gas Carburetted with Benzol.

The water gas used had been made with Dellwik-Fleischer plant, and, as stored in the gasholder on the day on which the testings were made, had a specific gravity of 0·5468, a calorific power at 10° C. and 760 mm. of 2705 calories per cubic metre (304 B.Th.U. per cubic foot) and the following composition:

Carbonic oxide	44·41 per cent.
Hydrogen	48·45 ,,
Carbonic acid	2·44 ,,
Nitrogen (by difference)	4·70 ,,

This gas was carburetted by being passed three times in succession through the experimental carburettor at the works. The weight of benzol vaporized was 147·7 oz. per 1000 cubic feet of water gas; and the volume of the gas after carburetting was 1048 cubic feet. The carburetted gas, at the outlet of the carburettor, consequently contained 140·7 oz. of benzol per 1000 cubic feet. After it had passed through a pipe 260 feet long, an analysis of the gas gave the following results:—

Benzol vapour	3·23 per cent.
Carbonic oxide	43·22 ,,
Hydrogen	47·31 ,,
Carbonic acid	2·24 ,,
Nitrogen (by difference)	4·00 ,,

The benzol amounted to 120·6 oz. per 1000 cubic feet; the specific gravity of the gas at 0° C. and 760 mm. was ·6257; and its calorific power (at 10° C. and 760 mm.) was 3561 calories per cubic metre (400 B.Th.U. per cubic foot).

The results obtained with the simple water gas, this carburetted water gas, and mixtures of the two in various proportions are shown in Table VIII. The testings made with the mixtures were confined to the illuminating power in incandescent burners. The following are the figures obtained with the undiluted carburetted water gas in the ordinary burner: Official Paris Illuminating Power: Rate of consumption required to produce under a pressure of 3½-10ths a light of one carcel (= 9·8 candles) in the Bengel burner = 4·85 cubic feet per hour, representing 1936 B.Th.U., and giving a duty of 2·022 candles per cubic foot, or 197·6 B.Th.U. per candle. Absolute Illuminating Power: Rate of consumption required to produce a light of one carcel in a Sugg argand burner, with the air supply regulated to give the maximum intensity = 3·80 cubic feet per hour, representing 1513 B.Th.U., and giving a duty of 2·59 candles per cubic foot, or 154·2 B.Th.U. per candle. There were required 3·90 volumes of air per volume of gas.

The simple water gas could only be burnt in the ordinary Welsbach burner by almost completely closing the air-inlet holes. In the tests of "customary" illuminating power, this gas was burnt under a pressure of 38-10ths, and the carburetted water gas under 27½-10ths.

Table VIII.—"*Customary*" *and* "*Absolute*" *Illuminating Powers with the Incandescent Burner.*

	Customary.	Absolute Illuminating Power.						Customary.
Gas consisting of :—								
Simple water gas, vols. per cent.	100	100	82·7	66·0	47·1	39·4	—	—
Carburetted water gas, vols. per cent.	—	—	17·3	34·0	52·9	66·0	100	100
Ounces of benzol in 1000 cubic feet of gas	0	0	20·8	40·8	63·5	72·7	120	120
Calorific power, B.Th.U. per cubic foot	304	304	320	336½	349	362	400	400
Consumption per hour; cubic feet	8·00	14·15	15·10	14·71	14·52	14·00	11·86	6·57
Consumption per hour; equivalent in B.Th.U.	2430	4298	4834	4920	5068	5072	4751	2628
Absolute intensity—candles	60·55	218·7	251·5	264·1	277·2	279·0	250·8	75·02
Duty $\left(\frac{I}{G}\right)$ candles per cb. ft.	7·55	15·45	16·65	17·95	19·11	19·92	21·08	11·42
,, B.Th.U. per candle	40·2	19·66	19·21	18·75	18·26	18·18	18·60	35·0
Vols. of air per vol. of gas	—	2·011	2·211	2·304	2·409	2·539	2·794	—

Observations on the Results Recorded in Table VIII.

I.—Granting that the benzol is the only source of luminosity in the ordinary flames, and that the carburetted water gas at the burner contains 120 oz. of benzol per 1000 cubic feet, the amount of benzol per candle is—

With the Official Paris Method (Bengel burner) = 25·10 grains.
,, "Absolute" Method (Sugg burner) = 19·45 ,,

II.—Looking at the absolute illuminating power in the incandescent burner, it will be seen that the duty per cubic foot clearly increases with the amount of benzol present, as, for instance, from 15·45 candles per cubic foot for simple water gas to 21·08 candles per cubic foot for the richest gas—an increase of 36 per cent. On the other hand, the duty per unit of heat is almost constant, showing only a slight tendency to increase. The limits are 19·66 B.Th.U. per candle and 18·60 B.Th.U. per candle, or an increase in the light obtained per unit of heat of only 8 per cent. It appears, therefore, that the effect of benzol in incandescent lighting depends chiefly on its calorific power. There is, further, a slight gain, evidently due to the flame temperature of benzol vapour being higher than that of water gas. This was pointed out in the preceding memorandum (Vol. XCIX., p. 831).

III.—The results given for the "customary" illuminating power in incandescent burners do not answer to the definition of that property given in Section I., because it was found that the flame of either the simple or the carburetted water gas at 27½-10ths pressure did not fill a No. 2 mantle, and consequently the

* See "Journal," Vol. XCIX., p. 575.

TABLE IX.—*Mixtures of Coal Gas and Water Gas.*

	(a)																		(b)												(c)											
	Ordinary Illuminating Power.				Incandescent Illuminating Power.				Ordinary Illuminating Power.				Incandescent Illuminating Power.						Ordinary Illuminating Power.				Incandescent Illuminating Power.						Ordinary Illuminating Power.				Incandescent Illuminating Power.					
	Paris.		Absolute.		Customary.		Absolute.		Paris.		Absolute.		Customary.		Absolute.				Paris.		Absolute.		Customary.		Absolute.				Paris.		Absolute.		Customary.		Absolute.			
	Coal Gas.	Mixture.	Coal Gas.	Mixture.	Coal Gas.	Mixture.	Coal Gas.	Mixture.	Coal Gas.	Mixture.	Coal Gas.	Mixture.	Coal Gas.	Mixture.	Coal Gas.	Mixture.	Water Gas.		Coal Gas.	Mixture.	Coal Gas.	Mixture.	Coal Gas.	Mixture.	Coal Gas.	Mixture.	Water Gas.		Coal Gas.	Mixture.	Coal Gas.	Mixture.	Coal Gas.	Mixture.	Coal Gas.	Mixture.	Water Gas.	
Group																																						
Water gas in mixture, p.c. .																																						
Specific gravity of coal gas .	20								30										50																				
" " water gas .	·4255								·4214										·5183																				
" " mixture .	·5370								·5354										·5456																				
" "	·4533								·4575										·5331																				
Calorific power of coal gas, B.Th.U. per cubic foot .	583								585										709																				
Calorific power of water gas, B.Th.U. per cubic foot .	297								289										301																				
Calorific power of mixture, B.Th.U. per cubic foot .	521								498										509																				
Consumption per hour—c.ft.	3·83		3·36		4·00		8·21		3·97		3·37		4·01		8·73				2·74		2 44		3·53		8·11				2·74		2 44		3·53		8·11			
Consumption per hour — Equivalent in B.Th.U. .	2230		1957		2328		4790		2325		1973		2344		5113				1943		1727		2303		5748				1943		1727		2303		5748			
Absolute intensity—candles.	9·80		9·80		68·9		237·0		9·80		9·80		69·4		248·8				9·80		9·80		69·4		245·7				9·80		9·80		69·4		245·7			
Duty $\left(\frac{I}{G}\right)$—Candles per c.ft.	2·56		2·92		17·25		28·88		2·47		2·01		17·30		28·50				3·58		4·02		21·61		30·31				3·58		4·02		21·61		30·31			
B.Th.U. per candle .	227·5	250·8	199·6	205·0	33·77	38·35	20·18	19·90	237·0	318·4	201·1	231·6	33·80	47·10	20·55	20·24			198·3	251·5	176·1	201·6	36·09	75 90	23 40	22 62			198·3	251·5	176·1	201·6	36·09	75 90	23 40	22 62		
Vols. of air per vol. of gas .	—	—	6·989	5·921	—	—	4·949	4·382	—	—	6·985	5·472	—	—	4·998	4 050			—	—	9·15	5·63	—	—	6·025	3·959			—	—	9·15	5·63	—	—	6·025	3·959		
Pressure at burner—tenths of an inch	1½	1¾	—	—	2·7½	2·7½	—	—	1½	2	—	—	2·7½	2·7½	—	—			1½	2¾	—	—	2·7½	2·7½	—	—			1½	2¾	—	—	2·7½	2·7½	—	—		

Not tested; differs little from water gas in Group *a*.

nipple of the burner had to be enlarged. The figures, therefore, must be regarded only as approximations to what would be obtained if the burners were modified to adapt them to the consumption of this kind of gas.

SECTION III.—NEAT COAL GAS COMPARED WITH THE SAME GAS WITH THE ADDITION OF WATER GAS.

The testings made comprised: (*a*) Eleven testings upon mixtures of various samples of coal gas with 20 per cent. of water gas; (*b*) two on similar mixtures containing 30 per cent. of water gas; and (*c*) one testing of a specially rich coal gas with 50 per cent. of water gas. The mean results obtained with each group of mixtures are given in Table IX.

OBSERVATION ON THE RESULTS RECORDED IN TABLE IX.

I.—In regard to the illuminating power in ordinary (argand) burners, it appears that the addition of water gas to the extent of 20 per cent. to coal gas lowers the official Parisian illuminating power by 18·9 per cent., but the "absolute" illuminating power by only 13 per cent. But the same thing occurs when a poor coal gas is added to a rich coal gas; and hence it may be stated generally that the official Paris method of testing depreciates poor gases more than rich gases.

II.—In regard to the "customary" incandescent illuminating power, the losses resulting from the addition of water gas appear to be very considerable—from 23 to 69 per cent.; but they are apparent rather than real. They indicate only that the usual burner is less and less suitable for a gas as the ratio of its specific gravity to its calorific power becomes higher. It follows that it is necessary to enlarge slightly the gas-nipples of ordinary incandescent burners when an unenriched mixed gas is to be used. Thus by a slightly increased consumption, the same absolute intensity as before would be obtained.

III.—In regard to the "absolute" illuminating power in incandescent burners, it appears that the loss of illuminating power per cubic foot of gas consumed is 5·8 per cent. for 20 per cent. of water gas, 13·6 per cent. for 30 per cent. of water gas, and 25·8 per cent. for 50 per cent. of water gas in a specially rich gas. The duty per unit of heat expended, on the other hand, remains nearly constant, although slightly increasing in the mixed gases. The gain is 1·30 per cent. for the 20 per cent. mixture, 1·45 per cent. for the 30 per cent., and 3·20 per cent. for the 50 per cent. (rich) mixture. This small gain is evidently due to the effect of the high flame temperature of water gas. The approximate constancy of the duty per unit of heat confirms, however, the theory that the absolute illuminating power in incandescent burners is practically proportional to the calorific power of the gas.

(*To be continued.*)

The Franco-British Exhibition, 1908.

In answer to numerous inquiries, the Council of the Society of British Gas Industries state that the Society will be unable to officially support the above exhibition.

Lectures at the Manchester Gas Exhibition.

We have received from Mr. H. Kendrick, of Stretford, the following list of lectures to be delivered during the forthcoming Gas Exhibition in Manchester (Oct. 23 to Nov. 9). With the exception of the one by Mr. Dugald Clerk, on the 25th inst., which will be given at three o'clock in the afternoon, all the lectures will be at 7 p.m.

Thursday, Oct. 24.—"The Uses of Gas." By Mr. T. DUXBURY, of Oldham.
Friday, Oct. 25.—"Coal Gas for Power and Heating." By Mr. DUGALD CLERK, M.Inst.C.E., F.C.S.
Saturday, Oct. 26.—"Town Smoke; Its Composition, Cost, and Prevention." By Mr. R. H. CLAYTON, B.Sc. F.C.S.
Monday, Oct. 28.—"Modern Lighting." By Mr. J. G. NEWBIGGING, M.Inst.C.E., of Manchester.
Tuesday, Oct. 29.—"Air Pollution and Smoke Prevention." By Professor J. B. COHEN, Ph.D., B.Sc., of the Leeds University.
Wednesday, Oct. 30.—"Maintenance and Adjustment of Incandescent Burners." By Mr. H. KENDRICK, of Stretford.
Thursday, Oct. 31.—"The Uses of Gas." By Mr. T. DUXBURY.
Friday, Nov. 1.—"Gas, Hygiene, and Ventilation." By Mr. J. H. BREARLEY, of Longwood.
Monday, Nov. 4.—"A Ready Remedy for Smoke." By Mr. J. W. GRAHAM, of Victoria University, Manchester.
Tuesday, Nov. 5.—"The Poor Man's Light." By Mr. S. MEUNIER, of Stockport.
Wednesday, Nov. 6.—"Maintenance and Adjustment of Incandescent Burners." By Mr. H. KENDRICK.
Thursday, Nov. 7.—"Modern Lighting." By Mr. J. G. NEWBIGGING.
Friday, Nov. 8.—"The Poor Man's Light." By Mr. S. MEUNIER.

The Midland Junior Gas Engineering Association will hold the first general meeting of the third session at the City of Birmingham Technical School on Saturday, the 12th inst. The President Elect (Mr. W. E. Caton) will deliver his address; and Mr. H. Burgess will read a paper on "High-Pressure Lighting on the Midland Railway."

BARNSTAPLE ELECTRIC LIGHT "DEFICIENCY."

When is a loss not a loss? Judging from a debate in the Barnstaple Town Council last week on the subject of the electric light accounts, the correct answer is, When it is a deficiency. Some members of the Council were much concerned that Mr. Hubert Leicester, the Chartered Accountant, after his exhaustive investigation of the affairs of the undertaking, should have come to the conclusion that the result of the five years' trading is a "loss" of £1830. If he had described it as a "deficiency," apparently all would have been well; at all events, it would not have sounded quite so bad. Mr. Barrett, the Chairman of the Electric Light Committee, seemed reluctant to admit the possibility of a deficit. In a long speech, he entered into a calculation which led to the conclusion that, instead of a loss, there has actually been made a profit of £5815. It is unfortunate for the ratepayers that this sum is not in existence as a bank balance. All of it, indeed, has gone in payment of interest and redemption of loans; so that, instead of tangible profit, there is still the loss of £1830 on which Mr. Leicester insists. Mr. Barrett's elaborate calculation did not take into account the heavy contribution the ratepayers have made to the income, or "profit," of the undertaking in the form of payment for street lighting; and as there is a "profit," he, of course, said nothing about the proposal to contribute £1000 from the general rate account towards the loss of £1830. Nevertheless, this £1000 is equivalent to a rate of 5d. in the pound; so that there would seem, after all, to be very substantial ground for Mr. Leicester's contention that the undertaking has not been profitable. For the present, the balance of £830 is to be carried forward; but unless the undertaking yields much more substantial results than it has hitherto done, this also will have to be paid out of the rates, and will represent a further contribution of 4d. in the pound. It is fortunate for the Town Council that there is a balance in hand on the general rate account; for the ratepayer—patient animal that he is—would scarcely have stood being "milked" to this extent without kicking.

With regard to the future, the attitude of the supporters of the electric light undertaking is one of as little concern as that which they display respecting the past. Mr. Leicester's recommendation, that provision should be made for the depreciation of the plant, was described by one gentleman as "utterly absurd," and by another as "impossible." Of course it is impossible, if there is to be even the shadow of a pretence that the concern is paying its way, or ever will do so. According to Mr. Barrett, the period allowed by the Local Government Board for the repayment of the loans on the undertaking is, on the average expectation of the "life" of the different sections—land, buildings, machinery, cables, and so forth—sufficient to provide for all contingencies. To set aside a larger sum would, he says, only have the effect of handing over to posterity an undertaking free from debt and complete in every detail. This contention goes to the very root of the policy of municipal trading. If corporations are not to maintain their undertakings in a state of efficiency, with a view to some day seeing them free from debt, what is the good of it all from the point of view of the ratepayers? If debt is to be continually increased in order to replace worn-out assets, who, in the end, is going to benefit? It may be "utterly absurd" to talk of adding to the burdens of the present generation of ratepayers at Barnstaple, who have a perfect right to say that the electric light business is costing them as much as they can afford; but even so it is questionable policy to make no provision for the future. The Corporation will not be able to plead that it has not been warned. Mr. Leicester calculates that a sum of £2170 ought to be allowed each year for depreciation, whereas only £676 is being set aside for repayment of loans. Mr. Barrett's idea is that it is good policy to limit the provision for the future to the smaller sum, and meet contingencies as they arise, either by raising fresh loans or by contributions from the rates. In the mind of a business man dealing with his own affairs, there can be no question as to which of these is the wiser policy. But municipal undertakings are not conducted on business lines; and the last thing a town councillor seems to think of is that the principles which guide him in the prudent conduct of his own affairs should be applied to those public matters which are for the time being committed to his care and control.

Michigan Gas Association.—The annual meeting of this Association was held at Battle Creek from the 18th to the 20th ult. In addition to the Inaugural Address of the President (Mr. V. F. Dewey), papers on the following subjects were submitted: "Obtaining an All-the-Year All-Gas Kitchen," by Mr. J. R. Huntting; "Fuel Briquette Manufacture at Detroit," by Mr. W. S. Blauvelt; "Studies in the Manufacture of Coal Gas," by Messrs. A. H. White and F. E. Parke; "Ways and Means to Increase Gas Sales," by Mr. E. J. L'Esperance; "A New Method of Condensing and Scrubbing," by Mr. W. Seymour. Mr. Parke, whose name is coupled with that of Mr. White, is the holder of the Michigan Gas Association Fellowship in the University of Michigan; so that their joint contribution will be of special interest. In addition to the papers, a report was submitted on the subject of the above-named Fellowship, and another by a Special Committee appointed to consider rules and suggestions for doing away with accidents in gas-works.

YORKSHIRE JUNIOR GAS ASSOCIATION.

Visit to the "Aire" Tar-Works.

Profitable and interesting as the varied series of excursions planned during the past few years by the Yorkshire Junior Gas Association have been, few had been awaited with more expectancy and curiosity than the one paid on Saturday last to the "Aire" Tar-Works at Knottingley, near Pontefract, belonging to Messrs. Stainsby and Lyon. Considering the remoteness of the village from the homes of many of the members, and the tedious long-continued railway journeys that very many had to undergo, the attendance was gratifyingly large, and the recompense adequate. Nearly all present had some acquaintance with the usual tar-distilling plant, but few, if any, had ever seen so large, so fully equipped, and so systematically planned a works.

The works, which cover an area of six acres, were originally erected nearly thirty years ago by the present head of the firm, Mr. J. G. Lyon; and all subsequent additions and modifications have been planned by him. The general arrangement is the same as that embodied in the Beckton Tar-Works of the Gaslight and Coke Company, which were also designed by Mr. Lyon—many of the details and forms of plant being similar; so that originally this was almost a smaller replica of the famous London works. All bears the impress of a far-seeing control; and the indications of the owner's individuality were even more commented on than the technical details. The ever-present fear of fire and the need of precautionary measures were evidenced in the wide open spaces separating various sections of the works, the slight wooden roofs and bare substantial brick walls of the sheds (so that a fire would be confined laterally and freely burn upwards), the asbestos paint and paper used in the laboratories, the vast extent of the underground storage vessels and tanks, and the entire concentration of all fires into one portion remote from the storage tanks of the more volatile oils. The works adjoin the Aire and Calder Canal, most of the tar being brought by specially constructed boats, and pumped direct into storage-tanks; while many of the finished products, especially those passing to the Continental markets through the ports of Hull and Goole, are also conveyed by water. The railway, though near, does not communicate with the works; and a new departure in road traction was seen in the shape of a powerful steam-motor tank-vessel for fetching tar and delivering creosote—sleeper-pickling being carried out by the Lancashire and Yorkshire Railway at Knottingley.

Much attention was devoted to the method of heating the thirteen stills by steam-air producer gas; and the convenience and advantages of the method were emphasized. Special notice was also given to the French pitch-coolers. One of these was being cleaned after running thirteen years; and thus its construction and method of action were more easily grasped. The members saw how their use—one to four stills—promoted the homogeneity of the pitch. The usual carbolic acid and sulphate of ammonia plants were duly described; and much interest was evidenced in the pyridine recovery plant, both in the account of its working and the character and uses of the pyridine itself. A quantity of the finished article was shown and handed round in an open vessel, so that whatever else the visitors forget about pyridine they will remember its distinctive smell.

The processes of re-fractionating the light oils and rectifying them are very fully carried out at these works; and the fractionating columns with which several stills were fitted were new to many of the visitors. Much amusement was created by the examination of the acid employed in sulphate making—a very dark coloured liquid that has been used for washing the lighter oils, and which formerly was a waste product. Amusement was succeeded by incredulity when the wonderfully good coloured sulphate made from it was shown. Here most of the party felt that they were on familiar ground, and were able to appreciate the degree of excellence characterizing the working of the whole establishment. The vagaries of the tar market, the violent contrasts of its prices, and its permanent charges were brought vividly home to the visitors by the sight of barrels of anthracene prepared and packed when prices were high, and now practically unsaleable. The final impression that all brought away was that, in planning, fitting, and upkeep, these were quite model works, though hardly set in a "Garden City;" and the general air of quite man-of-war trimness, order, and cleanliness was such as to make them begin to revise their ideas of what chemical works may look like.

Mr. J. G. Lyon himself acted as guide, and assisting him were his son, Mr. H. L. Lyon, Mr. Harker, the Works Manager, Mr. Holliday, the Chemist, and Mr. Kipping, the Chief Clerk. All that thoughtful kindliness could do to make the visit wholly enjoyable and pleasant was done. The visitors travelled to and from the works in waggonettes provided by Mr. Lyon; and all joined in an *al fresco* tea on the works lawn—a charming expanse of fine green turf. During the tea, Mr. Lyon conversed more fully with visitors interested in the profit-sharing and sick club scheme which he has introduced, and to which he had referred during his preliminary remarks to the members assembled in the laboratory before starting on the round of the works. Cordial votes of thanks to Mr. Lyon for his many kindnesses during the afternoon, and also to his staff, were passed after brief speeches by the President (Mr. G. W. Fligg), the Vice-President (Mr. J. H. Hill), and Mr. W. Cranfield, of Halifax.

MANCHESTER GAS EXHIBITION.

(Oct. 23 to Nov. 9, 1907.)

PRELIMINARY LIST OF EXHIBITORS.

ON THE GROUND FLOOR.

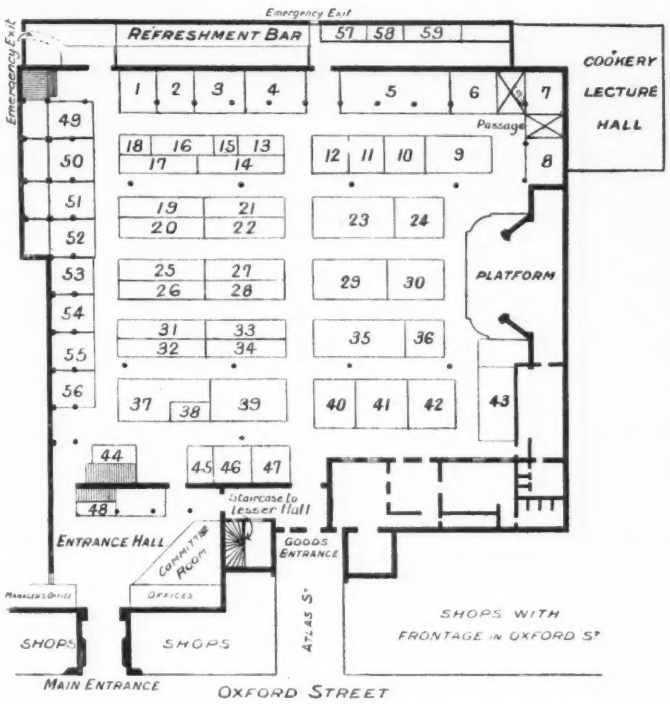
1. Anderson and Duffield, Farringdon Road, E.C.
2. Lees, Asa, and Co., Oldham.
3. Hands, G., Farringdon Road, E.C.
4. Russell, J., and Co.. Manchester.
5. Falk, Stadelmann, and Co., Farringdon Road, E.C., and Glasgow.
6. Manchester Paint and Varnish Company, Manchester.
7. Gibbons Bros., Dudley.
8. Podmore, A. E., and Co., Charles Street, Hatton Garden, E.C.
9. New Inverted Incandescent Gas-Lamp Company, Farringdon Avenue, E.C.
10. Moffat's, Farringdon Road, E.C.
11. Friedrich, Ludwig, Manchester.
12. Ramie Company, Bredbury, near Stockport.
13. Glover, T., and Co., Queen Victoria Street, E.C.
14. New Hygienic Stove Company, Huddersfield.
15. Barker. John, and Co., Kensington, W.
16. Wright and Butler, Birmingham.
17. Planet Foundry Company, Guide Bridge, near Manchester.
18. Hayward and Co., Great James Street, E.C.
19. Cannon Iron Foundries, Deepfields, near Bilston.
20. Wilsons and Mathiesons, Armley, near Leeds.
21. Wright, John, and Eagle Range, Birmingham.
22. Carron Company, Carron, Stirlingshire.
23. Sugg, W., and Co., Westminster, S.W.
24. Laddite Incandescent Mantle Company, Ely Place, E.C.
25. Davis Gas-Stove Company, Camberwell Road, S.E.
26. Main, R. & A., Falkirk and Glasgow.
27. Richmond Gas Stove and Meter Company, Queen Victoria Street, E.C.
28. Clark, S., and Co., Canonbury Road, N.
29. Keith and Blackman Company, Farringdon Avenue, E.C.
30. Gratrix, S., Jun., and Bro., Manchester.
31. Arden Hill and Co., Birmingham.
32. Fletcher, Russell, and Co., Warrington.
33. Imperial Stove Company, Leamington Spa.
34. Parkinson and W. & B. Cowan, Manchester.
35. Welsbach Incandescent Gaslight Company, Gray's Inn Road, W.C.
36. Pneumatic Gas Lighting Company, Farringdon Street.
37. Fletcher, Russell, and Co., Warrington.
38. Sutcliffe, Godfrey, Anerley, S.E.
39. Bray, Geo., and Co., Leeds.
40. Anti-Vibration Incandescent Lighting Company, Otley.
41. Wholesale Fittings Company, Commercial Street, E.
42. Baxendale and Co , Manchester.
43. Wright, A., and Co., Victoria Street, S.W.
44. British, Foreign, and Colonial Automatic Light-Controlling Company, Bristol.
45. Williams, J. E., and Co., Manchester.
46. Stockton Heath Forge, Warrington.
47. Moores, Makinson, and Co., Manchester.
48. Alder and Mackay, Edinburgh.
49. "Pifco" Company, Manchester.
50. Bland and Co., London and Manchester.
51. Rotary Meter Company, Manchester.
52. Edgar, W., Hammersmith, W.
53. Bever and Wolff, Bradford.
54. United Flexible Metallic Tubing Company, Queen Victoria Street, E.C.
55. Macpherson, D., and Co., Manchester.
56. Stott, Jas., and Co., Manchester.
57. National Gas-Engine Company, Ashton-under-Lyne.
58. Electro Motors, Openshaw, Manchester.
59. Crossley Bros., Openshaw, Manchester.

IN THE GALLERY.

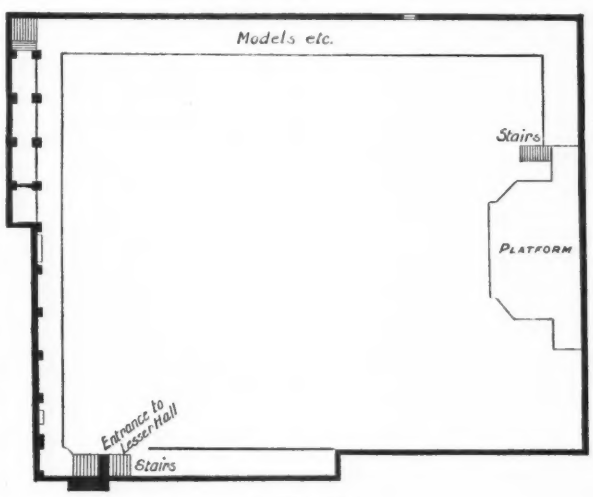
Braddock, J. & J., Oldham.
Imperial Stove Company, Leamington Spa.
Lune Light Company, Lancaster.

IN THE MODEL SECTION IN THE GALLERY.

Braddock, J. & J., Oldham.
Bryan Donkin Company, Chesterfield.
Cowan, W. & B., Edinburgh.
Clapham Bros., Keighley.
Cockey and Sons, Frome.
Economical Gas Apparatus Construction Company, London.
Dempster, R., and Sons. Elland.
Hardman and Holden, Manchester.



Ground Floor of Hall.



Gallery Plan.

M'Dougall Bros., Manchester.
Milne, J., and Son, Leeds.
Oldham Gas Students' Model Gas-Works.
Pass, E., and Co., Denton.
Ruscoe, J., and Co., Hyde.
Spencer, W., Elland.
Taylor, J., and Co., Bolton.
Walker, G. & W., Donnington.
Waller, G., and Co., Stroud.
West's Gas Improvement Company, Manchester.

THE INAUGURAL DINNER.

We learn that invitations are being issued by the Joint Advisory Committee of the Manchester Gas Exhibition to the following: The Council of the Institution of Gas Engineers; the gentlemen taking part in the opening ceremony; the lecturers; the Mayors of the towns and the Chairmen and members of the Gas Committees and Boards who are patrons of the exhibition; the Presidents and Secretaries of District and Junior Gas Associations; the exhibitors (not to exceed three from each firm); the members of the Manchester District Institution of Gas Engineers; and the members of the Advisory Committee.

It is stated that there are more coke-ovens being erected in the Connellsville and neighbouring regions of the United States than have ever been known before in the history of the coke trade. The number in hand and projected is 7950, and work on them is only restricted by the difficulty in getting labour.

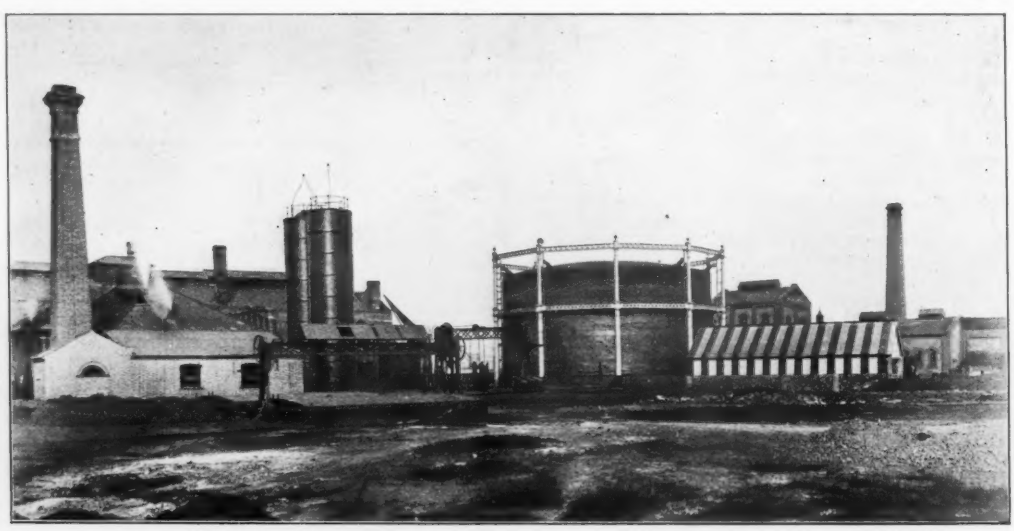
EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

Meeting at Gravesend.

The members of the Association held their General Meeting at Gravesend on Thursday last; the incoming President being Mr. Joseph Davis, the Engineer and Manager of the Gravesend Gas Company. Inconveniently located as the town is for many of the members in the northern part of the extensive area of the Association, they assembled in good numbers from all parts of the district—an excellent tribute to the personal popularity of Mr. Davis, which has never receded from the high-water mark that it attained at the time he was the energetic Hon. Secretary of the old Gas Institute, when he became wider and better known by personal contact with the gas fraternity in all quarters. There was another thing that was evident, too, at the meeting on Thursday, and that was that Mr. Davis is just as indivisible a part of the gas undertaking at Gravesend as—let us say—the plant itself. Gravesend is a town with a long history, and a feature of that history is the hospitality that has ever been shown by those having prominent part in the town's affairs. The Chairman and Directors of the Gas Company did the honours on this occasion with liberal hand. It was at the Clarendon Hotel that the members met; and there they were entertained to luncheon by the Company. The genial Chairman (Mr. M. A. Troughton, J.P.) presided; and he was supported by Mr. J. A. Limbert, J.P. (the Deputy-Chairman), and Messrs. G. Sandford, J. Rhodes, J.P., and George Wood (Directors). The retiring President (Mr. E. J. Brockway, of Cleethorpes), and the incoming President (Mr. Davis) had places of honour at the table. Among others present associated with the Gas Company were Mr. W. Troughton (Secretary and Solicitor), Mr. W. Hammond (Accountant), and Mr. A. G. King (Assistant Engineer). Before pronouncing grace, the Chairman cordially bid the members welcome to the town, and expressed his hope that they would have a thoroughly successful meeting.

The members could not leave the hospitable board, without thanking the Chairman and Directors for their whole-hearted reception. The President (Mr. Brockway) voiced the sentiments of the visitors. He said he was sure they would desire him to at once propose "The Health of the Chairman and Directors of the Gravesend Gas Company." At their half-yearly meetings, the members were always received with the greatest cordiality by those administering the gas supply of the various towns; and that day there had been no exception to the rule. They had had a delightful luncheon; and the programme arranged for the members both for that day and the next, terminating with a drive through Dickens's country, would, he was sure, have the tendency of leaving with them an impression that would long be retained among their most agreeable and pleasant recollections.

The toast having been heartily honoured, the Chairman, on behalf of himself and co-Directors, thanked the members for the cordial way in which they had received the toast. In referring to general matters, he said he was afraid, from the technical point of view, they had not in Gravesend much to show the members. Their works were not like the big ones in the northern part of the country; but they were a comfortable, medium-sized works, and



A General View of the Gravesend Gas Company's Works.

were now in good order. He had had twenty years as Chairman of the Company; and he had been greatly aided by Mr. Davis, who had practically reorganized the works during that period. Among their latest extensions were a carburetted water-gas plant and a gasholder. The latter was designed by Mr. Davis, and was erected by Messrs. C. & W. Walker. It had been built nearly ten years, and had never had a tool on it, nor a leak in it; and all that it had required had been two or three coats of paint. The holder had a capacity of 600,000 cubic feet. He always mentioned this holder with the greatest satisfaction, because it replaced one that took it into its head to turn a somersault. But as an eminent gas engineer put it to him (the Chairman) the last time the Company went to Parliament, the Company had a nice little works, but did not spend extravagantly on them. The capital of gas companies was rising very much, what with the slot meter and the cooking-stove business. Although this was very satisfactory, and paid a good interest, the increase of capital per 1000 cubic feet was rapidly rising; and they could not keep it down. Mr. Davis did not seem to be particularly anxious about this. But the Directors had to consider the shareholders and the dividends; and they really did not like the capital rising at a quicker rate than the increase of business. However, the Company were going on satisfactorily. In his concluding remarks, the Chairman spoke of the action of the Corporation in regard to the electric lighting of the streets—a matter that will be found dealt with in the Presidential Address.

The only other toast was proposed by the President-Elect, and that was "The Health of the Secretary of the Company" (Mr. W. Troughton). Mr. Davis mentioned the keen personal interest his colleague had taken in the preparations for the meeting. The toast was also heartily honoured; and Mr. Troughton made generous acknowledgment in a few words.

Visit to the Works.

Brakes were awaiting the members outside the hotel to convey them to the gas-works, where they spent a delightful hour inspecting plant and system—from the method of bringing in the coal from the wharf by trolleys to the holders. Following the Chairman's suggestion, the carburetted water-gas plant (which is on the Economical Gas Apparatus Construction Company's system) were especial centres for the visitors' observation. There need be no general description of the works here, as the President made several references to their features in his Inaugural Address. The photographs which we publish were taken by the assistant machine-fitter on the works, Mr. H. Holden, jun.

BUSINESS MEETING.

The Business Meeting was held in the Masonic Hall; and at the commencement of the proceedings, the retiring President (Mr. Brockway) presided.

The Hon. Secretary and Treasurer (Mr. T. A. Guyatt) read the minutes of the meeting held at Lincoln on Thursday, April 18; and they were confirmed.

New Associate Members.

On the motion of Mr. J. H. Troughton (Newmarket), seconded by Mr. C. G. Grimwood (Sudbury, Suffolk), Mr. Thomas Duxbury, of Manchester, Mr. Charles F. Halls, of Thetford, and Mr. William Jones, of Birmingham, were elected to the class of associate members.

District Member of the Council of the Institution.

Mr. W. D. Child (Romford) proposed that Mr. Davis, the President-Elect, be appointed District Member of the Council of

the Institution of Gas Engineers. The members of the Association had shown their appreciation of Mr. Davis's services by conferring upon him the highest honour they had to bestow; and Mr. Davis had also great claims not only upon the Association, but on all the members of the Institution of Gas Engineers for the work he had performed as Secretary of the Institute during the time the amalgamation of the two chief organizations was being brought about. During the period he was Hon. Secretary of the Institute, he displayed the greatest tact and courtesy; and the members of the Council would be glad to welcome him among them as a suitable partner in their deliberations.

Mr. FRANK H. JONES (London) seconded the motion, which was heartily agreed to.

THE NEW AND RETIRING PRESIDENTS.

Mr. BROCKWAY said the time had arrived for him to leave the chair, and to ask the President-Elect to occupy it. For his own part, he could not quit the position without thanking every member of the Association for the courtesy and consideration shown him, and for the assistance he had received from one and all, during the year.

Mr. DAVIS, on taking the chair, was welcomed by acclamation. He said his first duty, as President, was to propose a very hearty vote of thanks to Mr. Brockway, for the way he had conducted the business of the Association during his year of office. The work had been done well and admirably. They all knew what an active man Mr. Brockway was. They were aware of the part that he took in public affairs at Cleethorpes—not only as Gas Engineer, but in connection with the District Council. Notwithstanding, he had been able to give attention to the work of the Association, and had conducted it in a manner that had given satisfaction to the members generally. They could not therefore do less than thank him, and sincerely regret that his presidential year had come to an end.

The motion was carried by applause.

Mr. BROCKWAY remarked that he was much obliged to the President for his kind words, and to the members for the cordial way in which they had endorsed them. He appreciated highly both the words and the expression of the members' approbation. His only regret was that business duties and other work had prevented him taking the active interest in, and spending as much time as he felt was necessary to effectively carry on, the duties of the chair. Any failings in this respect had been due not to lack of interest, but to lack of time.

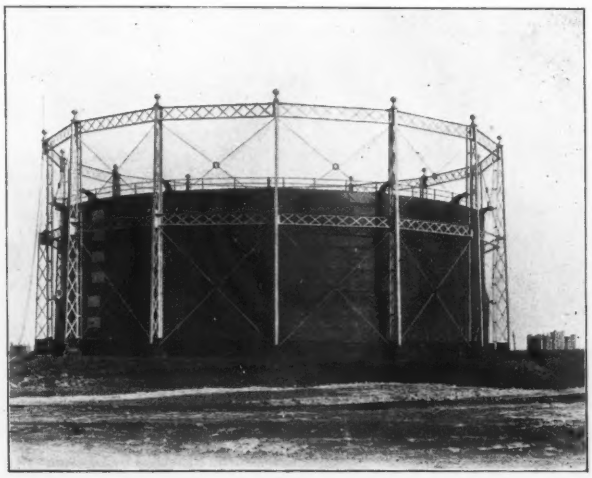
The PRESIDENT, before reading his Inaugural Address, said he should like to thank the members for having elected him to be the representative of the Association on the Council of the Institution. It was good indeed of Mr. Child to have made the remarks he had done in proposing the resolution. He (the President) did not know, however, that they were altogether deserved. It was true he had a very strong interest in the Institute; and he thanked the members sincerely for having placed him on the Council of the Institution.

The address which the President proceeded to deliver was as follows:

INAUGURAL ADDRESS.

Gentlemen,—First let me thank you for the great honour you have conferred upon me, and not only upon me, but upon the Company under whom I serve, in electing me your President—an honour which comes to me much sooner than I had any right to, or did, expect, and one which I assure you I deeply appreciate. I am not unmindful of the many responsibilities appertaining to the office, its prestige and its dignity; and although I enter upon the duties with an apparently light heart, I feel somewhat diffident as to my powers and capabilities to carry them out entirely to your satisfaction. But being assured of your united support and loyalty, together with the assistance of your Committee and guidance of our excellent Honorary Secretary, I hope

The New Buildings for the Carburetted Water-Gas Plant.



The Last Gasholder Erected—(capacity 600,000 cubic feet).

to go through my year of office satisfactorily in every way to you and to myself.

Our Association is now in the nineteenth year of its existence, with a total membership of 98 subscribers, including 17 associate members. To the founders—and nearly all are fortunately still with us—the position to-day, numerically and financially, together with the great progress made intellectually, must be to them, as it is to the rest of us generally, a cause for congratulation. The comparatively recently constituted Commercial Sections, founded mainly for the purpose of dealing with the residuals produced, continue to do good work in a quiet, unostentatious way. These sections are a very valuable adjunct to our Association; and it is to be regretted that stronger interest is not taken in them by the members generally—the information gathered at the meetings and otherwise being most beneficial, morally and financially, to the undertakings there represented. I would therefore urge upon every member of our Association the importance of pressing home to his Committee or Board of Directors the value of these sections to them; pointing out that the object to be attained is to get a fair and proper price for the coke and other residuals produced—thus preventing that "cut-throat" competition that has existed, and does unfortunately still exist, in dealing with them. The sections have to a large extent been very successful in attaining this object, as well as in securing some amount of even dealing in our purchases; but much more might be accomplished if a firm united front was shown, and a stronger interest taken in them by those very Committees and Boards of Directors whose undertakings these sections are formed to benefit, by supporting them financially and by representation at their meetings.

In welcoming you to the town of Gravesend, I am unable, as you have probably already perceived, to show you anything new or of striking interest in the manufacture of gas in the way of stoking machinery, conveyors, regenerative furnaces, &c., &c., such as one meets with in larger or more modern works. All of these will probably come in due course, as soon as the occasion demands; but it should be understood we are a Company of comparatively slow growth, keeping pace with the growth of the borough, outside of which, with one small exception, we are not permitted to go. Consequently, we have not met with those phenomenal or sensational increases in consumption, demanding extraordinary capital outlay, that have and are being experienced by others—possibly by some of yourselves, but particularly in the London suburbs and districts. Still we do steadily increase in our business; for the town itself, having awakened up and become alive to its responsibilities and importance, is rapidly increasing in population, and is, under a progressive Corporation, fast becoming one of the healthiest and cleanest residential towns in the kingdom. I had quite hoped to have shown you in operation a system of telpherage worked electrically, for unloading our coals, and carrying them direct into the stores, and for which Messrs. Siemens and Co., of Woolwich, had provided designs and price. But we have not yet been able to come to terms with the South-Eastern Railway Company, whose land we cross with our present railway; consequently, the matter hangs fire.

The history of our Company dates from 1824. In January of that year, a meeting of the inhabitants was called at the town hall, for taking into consideration the means to be adopted for lighting the town with gas, when it was resolved—"That the general use of gas light in most of the principal cities and towns of the United Kingdom sufficiently shows that great advantage would attend the introduction here, and that it would be attended with beneficial results from a pecuniary point of view to those who may be engaged in carrying it into effect." It was further resolved—"That a Company be forthwith established for lighting

the town with gas, to be called the Gravesend and Milton Gas-light Company." The original capital was £4000, raised by the issue of 200 shares of £20 each; and in order to give the inhabitants an opportunity of participating in such shares, no person was allowed to take more than three shares until about a month after the inception of the Company. At the expiration of this time, 132 shares had been taken up, when it was again resolved that each then subscriber of three shares be allowed to take an additional two shares; and on the 11th of February, 1824, the Clerk to the newly-formed Company was able to report that the whole 200 shares had been taken. Some little difficulty was experienced in getting a suitable site for the works. Eventually a piece of land, 101 feet in length by 90 feet in depth, was leased from Lord Darnley for 99 years commencing at Michaelmas, 1824, for the sum of £10 per annum; and on this land the first works were built. These were situate at the north-west side of the town, in a field then called Fair Field, and of which the present Bath Street occupies part of the site. The works were built by a Mr. Hedley, who appeared to have been both Engineer and Contractor, for the sum of £4000, though I find eventually this was increased to £4800. At six o'clock on the evening of Thursday, Dec. 8, 1824, the town was first lighted with gas; the Directors meeting specially for the purpose of superintending same. The scale of charges finally decided upon reads very strangely to-day and forms very interesting matter. They were as follows :—

Scale of Charges, Inclusive of Lighting per Annum.

Description of Burner.	Burning till 9 o'clock.	Till 10 o'clock.	Till 11 o'clock.	Per Hour Afterward.
Large argand or No. 1 batswing	£3 10 0	£4 2 0	£4 14 0	12s.
Smaller do., or No. 2 batswing	£3 0 0	£3 10 0	£4 0 0	10s.

Sundays one-sixth more.

Arrangements may be made to suit irregular times and hours of burning.

Gas may be taken by measure at 15s. per 1000 cubic feet.

On Saturdays the lights will be allowed to burn one hour longer.

Every argand burner to be used with a glass, and it is particularly recommended that the flames should not exceed 3 inches, affording at that height the greatest degree of brilliancy free from all impurity.

Payment to be made quarterly. The light cannot be taken for a shorter period than twelve months, nor be disconnected except at one of the quarter days, of which seven days' notice must be given.

Any persons burning the gas beyond the hour agreed for will subject themselves to an additional charge.

No burners to be used but such as are approved by the Company.

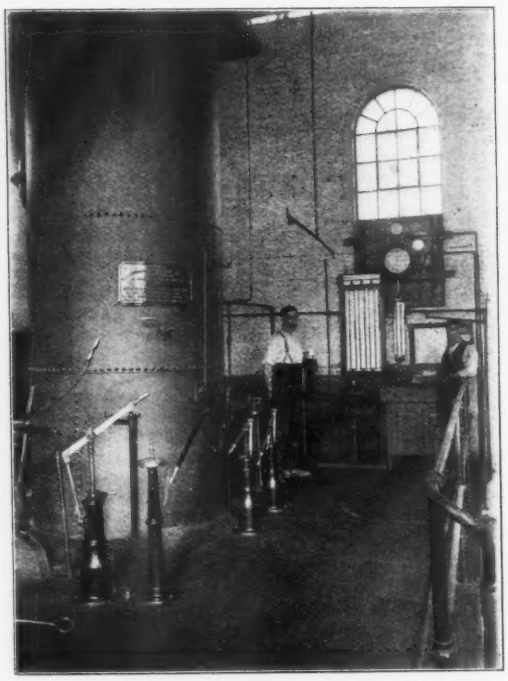
Gas-Works, July, 1824.

The scale of charges and regulations appear to have been based upon experience gained and information obtained from some 22 towns, among others being four in our own county—namely, Canterbury, Maidstone, Ramsgate, and Margate. The Company soon began to grow rapidly, and greater demands were made by the Commissioners of the town for public lighting, as well as by consumers for private supply. It became necessary to raise fresh capital for distribution purposes; and a further £1000 was obtained in February of the following year. The first annual general meeting took place in July of 1825, when a dividend of 5 per cent. was declared; and from that time onward the Company's progress has been one of continued prosperity.

The system of supplying gas on a time-basis was, as we may well suppose, a most unsatisfactory one; and the Directors had continually to caution consumers as to irregularities in their lighting hours. To induce consumption by meter, the price of gas was reduced to 12s. 6d. per 1000 cubic feet in January, 1829. In September of that year, it was resolved—"That any future application for the supply of gas in public-houses be declined, unless the parties seeking it consent to burn it by a meter to be furnished at their own expense." But it was not until the year 1845 that a real attempt was made to sweep away the time-system and supply by measurement, when notice was sent out to some 21 butchers, and subsequently to the fishmongers and grocers of the town, that they would not be supplied after the 25th of March "unless they burn by meter;" and from this period the time system gradually fell into disuse.

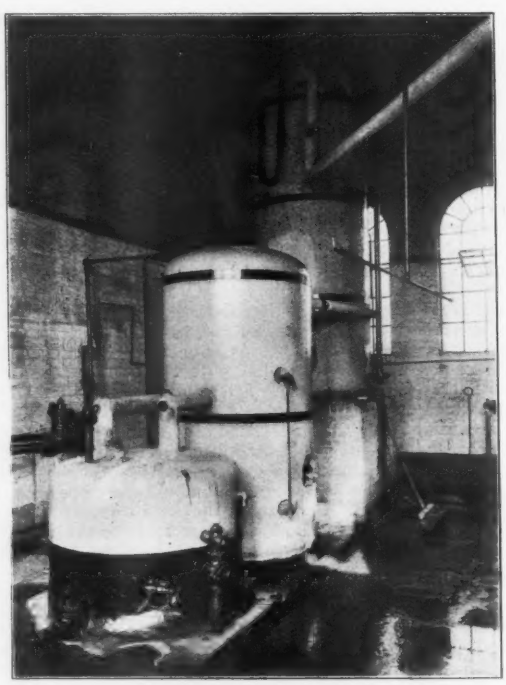
In 1842, the works were removed from the Bath Street site to their present position near the Canal Basin on the east side of the town. The annual make of gas had at this time reached 11 million cubic feet; and as the business was rapidly increasing, more room for extension was naturally required. The gas was reduced to 8s. per 1000 cubic feet, fresh capital was raised and its total increased to £20,000, and the Company then appear to have started in earnest the fruitful career they had so successfully maintained. I have often wondered why the present position was chosen for the works site, and why one with a river frontage had not been secured. History is silent on the matter; but it was a great pity this had not been done, for hundreds of pounds might have been saved by so doing in coal freightage alone.

From its inception up to the year 1862, the Company was simply a joint-stock Company; but in that year an application was made and obtained for an Act of Parliament incorporating the Company



A View on the Operating-Floor of the Carburetted Water-Gas House.
(Nominal Capacity of Plant at Present installed, 300,000 cubic feet.)

and conferring the usual powers for the better effecting their objects and purposes. Very little opposition appears to have been experienced in obtaining the Bill; the principal objections coming from the County and General Gas Company—a Company which had a number of small gas-works in various places around London, and among others, supplied the neighbouring parish of Northfleet. After successful and apparently peaceful negotiations, however, opposition was withdrawn; but not before a small slice of the



The Sulphate of Ammonia Plant.

Northfleet district had been scheduled in the Gravesend Bill. It was necessary to again appeal to Parliament for further capital in 1890; and the Company met with very strong opposition from the Corporation, which was not quite as pleasantly conducted as the previous opposition. Eventually, the Company obtained their

Bill by coming to terms with the Corporation; but in the compromise the Company, in my opinion, got the worst of the deal. Under the Act the standard of the gas was increased from 14 to 16 candles, the sulphur clauses were inserted—certainly with the somewhat wide margin of 22 to 25 grains—and the sliding-scale adopted with a neutral zone extending from 2s. 10d. to 3s. 6d. per 1000 cubic feet, which made it practically inoperative.

In 1900 it was again necessary to raise fresh capital, and Parliament was once more appealed to. The usual opposition from the Corporation was put in, but perhaps not to quite so bitter an extent. This time there was no compromise; the candle standard was reduced to 15, the neutral zone was abolished, the standard was fixed at 3s. 2d., and all the share capital converted to 5 per cent. stock. The standard price fixed was scarcely a fair one. All things being taken into consideration, I think this should not have been less than 3s. 4d. But the Parliamentary Committee seem to have added the Corporation requirements to the Company's wants, divided the results by two, and then struck the happy medium.

The following statement shows in a tabulated form the gas made and capital expended, &c., during the last seventeen years. The capital has more than kept pace with the increase in the gas made; but during this period we have nearly trebled our storage capacity, more than doubled our purifying area, added 50 per cent. to our daily producing capacity, and expended some £10,000 on our slot-meter business:—

Year.	Gas Made. Cubic Feet.	Capital Expended.	Per Million Feet Gas Made.	Coals Carbonized. Tons.	Gas Made Per Ton. Cubic Feet.
1890	97,584	£55,676	£569	—	—
1891	106,780	58,248	545	10,868	9,825
1892	105,788	59,146	556	10,786	9,808
1893	108,569	59,720	550	10,551	10,290
1894	108,383	60,973	562	10,593	10,232
1895	111,784	62,412	558	11,067	10,101
1896	111,245	70,744	636	11,064	10,055
1897	119,378	72,875	610	11,851	10,073
1898	122,255	73,610	602	12,077	10,123
1899	122,558	74,291	606	12,069	10,155
1900	129,749	75,170	580	12,265	10,579
1901	134,830	76,114	565	13,312	10,130
1902	138,437	80,104	586	13,677	10,120
1903	137,661	87,134	632	13,270	10,370
1904	141,312	89,861	636	13,855	10,200
1905	141,012	91,626	649	13,813	10,200
1906	144,994	93,566	645	13,942	10,400
1907	149,536	95,203	637	13,832	10,800

From the foregoing figures, it will be perceived, as I have already pointed out, that we are of comparatively slow growth; the increase on the seventeen years tabulated only amounting to 3·1 per cent. per annum compound. The most satisfactory feature contained in these figures refers to the last five years—a period covered by the introduction and supply, by the Corporation of Gravesend, of electricity for public and private lighting, and which has made no small headway. On this subject I shall have something to say later But referring to the table, it will be seen that, notwithstanding the opposition with which we have had to contend, the increase on the five years has been 11,099,000 cubic feet, although during this period we have lost no less than about 10 million cubic feet on public lighting account alone, as well as a large amount on the Municipal buildings and institutions. This increase, I am pleased to say, continues to be maintained; and I am in hopes that, notwithstanding the 2d. per 1000 cubic feet increase we have been compelled to put on the price (now 3s. 2d. per 1000 cubic feet), owing to the increased cost of coal and freights, we shall show an output on the year ending June next of 154 millions. When it is pointed out that this is being done on an area of about 2½ square miles almost completely covered with our mains, I think it will be admitted we are not unmindful of the duties we owe to the public generally, and our consumers and shareholders in particular. But we are not content to rest at this. We believe that, notwithstanding a powerful competitor in the shape of the Corporation electricity is in the field, we still have a large scope inside that area for considerably increasing our output; and we intend to increase it to the utmost.

So far I have been dealing with the history of our own undertaking, but not I hope unduly. I trust at any rate I have not wearied you with overmuch detail. Threatened industries, like men, live long and gather fresh vitality from the strenuous struggle for existence. Such is the text that we may apply to ourselves to-day. For the last twenty years at least we have been threatened by electricity, which was to sweep us all away into oblivion, but which, strange to say, has been the means of quickening the nerves and strengthening the vitality of our industry. While it cannot but be admitted that rapid strides have been made in the production of electricity for lighting, but particularly for power purposes, for which it is better suited, gas has more than kept pace with it, both as an illuminant and for power purposes, but particularly the former. The development of the bunsen burner, the improvements made in the incandescent mantle in strength and durability, the introduction of the inverted burner, by the use of which a much higher artistic effect can be obtained than had been previously attempted in gas-fitting designs, the means that can now be adopted by the Norwich switch system for easy lighting from any fixed point, all have succeeded in renewing and strengthening the foundation of our profession.

The introduction of prepayment or slot meters has been the means of rapidly increasing the use of gas; it has largely made good the loss sustained by the advent of our strongest opponent, and has been the means (which always appeared to me a blessing in disguise) of bringing our commodity to those of our poorer people who had previously used cheap and dangerous oil-lamps or tallow candles. Gas supply by the slot-meter system has come to stay, as the enormous number now in use conclusively proves; and it is difficult to understand that there are those who are still hesitating as to their commercial and financial utility. So far as Gravesend is concerned we have some 1700 of these meters in use, and some 150 applications still on our books, which have materially assisted in the increased output that I have been vain enough to boast of.

The race for supremacy in our carbonizing plant between horizontal and sloping retorts seems to have ended in a dead-heat—both systems working peacefully together, and in some instances side by side, each having its special and particular votary; and it is still a case of *quot homines, tot sententiæ*, or "so many men, so many opinions," as to the better system to adopt to produce the best financial results when extending or rebuilding this portion of our plant. But there is a third system now on trial in this country and on the Continent, in the vertical retort setting, which is being carefully and attentively watched. There is nothing new in the idea of a vertical retort. It has been the dream of many eminent engineers, now now more; and efforts have been made from earliest times to succeed in this direction. But hitherto all attempts have been failures.

Of the Settle-Padfield retort—in the success of which some of us have had strong hopes—little need here be said beyond the fact that, when put into actual practical use, one cannot help expressing a feeling of regret that it should have gone the way of the rest and turned out a complete failure. Of this we have ample proof in the Cleethorpes installation, about which our ex-President, Mr. Brockway, gave us an interesting account in his presidential address last September. How far this system might have proved successful by alteration and further experiments, which only time, money, and patience could produce, must be left to the imagination; but the results have shown that continuous carbonization in a partly empty retort, combined with the gasification of the tar vapours, has, in this case, at any rate, proved a direct failure.

A continuous retort has been introduced by Messrs. Glover and Young, of a far more pretentious type; and an installation has, I understand, been put up at the St. Helens Gas-Works, of which Mr. Glover is Engineer. A description of this retort was fully explained by Mr. Thomas Glover in his paper, on "The Retorting or Carbonization of Coal," read before the Institution of Gas Engineers in June, 1906.* Whether or not the plant is yet at work, I am unable to say; but if it is, it would perhaps be too early to give any particulars as to the working results, all of which we shall probably get from Mr. Glover in due time.

Then, again, we have the Dessau retort introduced by Herr Körting, of Berlin, which has been spoken of in high praise, and of which he himself is most enthusiastic and prophetic. This system appears to have got beyond the experimental stage, and I understand is being rapidly extended in a thoroughly practical form in Berlin. But I am afraid it will be some time before we shall be induced to expend our capital in this direction, at least, until we are thoroughly satisfied from the experience of others, which must take time, that we are, in this, moving in the right direction.

Of the Woodall-Duckham system, now on its trial at the Nine Elms works of the Gaslight and Coke Company, I am unable to say anything, beyond the fact that those engineers who have had the privilege of seeing the installation there at work are said to have been struck with the continuous and even working, and expressed in enthusiastic terms their satisfaction of all they had seen. It is too early yet to say how far this success will be maintained when the system comes on trial in a practical form. In each case we can express our admiration at the ingenuity shown in the development of these inventions, and wish the inventors all the success they are so well entitled to.

It will have been noticed that at the Gravesend Gas-Works the retorts are fired in the old-fashioned way of open fires. There is not a regenerative furnace on the place, without which the smallest works would be classed as out of date. I can assure you we are well aware of this; but to put in regenerative furnaces, the whole benches would have to be cleared and new ones erected. This has always appeared so formidable a task that my Directors have hesitated before doing anything in this direction. But it appeared to be gradually coming. However, a water-gas plant having been decided upon—for the reasons stated in my paper read at Lincoln at our last meeting—its advent has completely put off for some time any chance of a renewed retort-house. Attempts have been made to put down shallow regenerators; but we are so much troubled with water that they have proved a failure—simply because we could not get deep enough. I intend, however, to have another try. Before leaving the retort-house, I may say I have been much impressed with the statements of those engineers who have adopted the retort-house governor of Messrs. Parkinson and Cowan; and I hope to have one at work shortly. To be able to increase your make 500 feet per ton—and in my case I feel sure it can be done—with an increased candle power, is certainly worth the outlay expended.

* See "JOURNAL," Vol. XCIV., p. 873.

Of the rest of the manufacturing plant of a gas-works—speaking generally—I have nothing new or of importance to mention. No great revolution has been made in the condensing, scrubbing, or purifying plants in recent years, beyond the general adoption of water-tube condensers, rotary scrubbers and washers, and luteless purifiers. To the latter considerable assistance has been given by the insertion of vertical in place of horizontal grids; thus lightening the material and producing, in consequence, a greater purifying area, or at any rate a more thorough fouling of the material used, which I take to be the same thing. The gradual, and in some cases total, extinction of the sulphur clauses (which, as we know, were introduced to correct matters more sentimental than real) should considerably reduce the purifying account of those works lately under the ban, and at the same time removed what *was* a real nuisance—the disposal of the refuse material.

Of the residuals produced, the most important of which is our coke, the prices have been fairly good during the past year. Our Commercial Sections and those of a kindred Association have doubtless done something towards this—particularly in the Northern and Midland districts. In Gravesend, we are to a small extent shadowed by the London and Suburban Companies in the disposal of their coke; but now that we are water-gas manufacturers, and are using a large percentage of our own product, we are enabled to get a good price for the surplus, and have no coke for sale outside our own district.

Of the tar market I need say little. Let us hope that the experiments now being made by the various authorities throughout the country for covering or spraying their roads with tar or tar products will prove a success. An experiment in this direction was tried in Gravesend by our Borough Surveyor, on a stretch of road extending some 300 to 400 yards with oil-gas tar procured from our water-gas plant, which proved quite a success for the purpose intended. But the odour emanating from the tar became such a nuisance to the man in the street that the experiments had to be discontinued. There should, if these experiments prove successful, be a good future before the coal-tar market.

It is in the distribution and sale of gas that our more complete energies are called for in this age of competition. Hitherto these have been principally devoted to our works in providing the ways and means for improving and cheapening the gas produced. To gain the highest commercial and scientific knowledge in dealing with the material for and of its production has always been the aim of our profession—leaving to the "office" generally the means, and to the intelligent gasfitter the ways, of afterwards dealing with it. All this is now changed, resulting in more and more commercial stimulation by the aid of show-rooms, exhibitions, cookery and other lectures, and the employment of intelligent and courteous workmen. Much good has resulted in this direction, and the consumers themselves are beginning to get very different opinions of us than those formulated and in existence only a few years ago, to our mutual advantage.

Concerning high-pressure distribution—of which we have several examples in this country, used principally as trunk mains—one cannot help feeling and expressing astonishment at the facts connected with it, as gathered from the admirable paper on the subject read by Mr. R. M. Seale, of Rochester, New York.* The fact that it is possible to compress gas to 40 lbs. to the square inch and deliver this to consumers 50 miles away, and give satisfaction, is in itself one to be wondered at. True he is speaking of the "ordinary community using gas-ranges and doing its lighting largely with incandescent mantles, but with occasional open flames." The open flames, he says, "will not be as good as with the gas before compression; but they will pass, while the heating quality will be entirely satisfactory." I think it is news to many of us that it is possible to compress a comparatively low-grade gas to a pressure of 40 lbs. to the square inch and get anything like an illuminating result after a travel of 50 miles through a relatively small pipe. But to my mind the most astonishing fact emanated from Mr. George Helps, of Nuneaton, who told us that he was supplying through ½-inch pipe for five miles the lamps and houses on the road, and presumably giving every satisfaction, though he does not mention the initial pressure employed.

The difficulty in supplying gas at very high pressure direct to the consumer always appears to be in dealing first with the meter, and then with the fittings of the consumer; but it has been shown that there are ways and means for successfully dealing with these satisfactorily. To the open-flame consumers the high-pressure system would be of little value—at any rate, "the game would not be worth the candle;" while to the incandescent consumer the advantages would be very great. We have strong proof of this in the high-pressure systems of Onslow, Keith, Sugg, and others. Mr. Helps thinks it extraordinary that we should expect our customers to put down costly apparatus for increasing the pressure on their own premises, which by a small expenditure could be done at the gas-works. But can it? It is not so simple as he may think. His idea would, perhaps, have been carried out long ago by many of us had it been practicable; but to place these very high pressures on some of the existing mains and services, to say nothing of the consumers' fittings, would be somewhat risky, while to put them in a condition of safety would in all probability entail considerable expense. Still, I am strongly in favour of supplying gas under high pressure, because I believe the best result can be got out of our gas in the incandescent mantle by this means, particularly with the inverted burner. Much smaller pipes would be required, thereby reducing the capital outlay, and more artistic and less clumsy gas-fittings would be introduced on the market.

* See "JOURNAL," Vol. XCVIII., p. 936.

While our own industry is rapidly regaining supremacy in the public lighting of our cities and towns, Gravesend is taking a retrograde course. Previous to the advent of electricity in the town, all the public lighting was done with gas on the incandescent mantle system, and for its size was fast becoming one of the best-lighted towns in the kingdom, for which the Corporation themselves were to be credited. It is now fast becoming the worst. A natural desire to assist the finances of the electrical undertaking, the property of the town, has resulted in the Corporation gradually reducing the number of the gas-lighted streets into sombre semi-darkness, by the replacement and use of incandescent electric lamps, which the worst form of flat-flame gas lighting could give points to and beat.

We all know the difficulties which have attended this form of street lighting, which in the attempt have proved dead-failures; and this is no less so in Gravesend. But the ratepayer in general, and particularly the one in the electrically lighted area, gets little satisfaction, for not only does he have a considerably poorer light, but it is at a much higher cost. The following table gives the cost of public lighting from 1902, the year previous to the introduction of Corporation electricity, to 1906, which speaks for itself. I should mention that the main road and two of the principal thoroughfares, with a few centres, are lighted with arcs of varying candle power. Thirty-two of these lamps replaced 52 gas-lamps, covered by a distance of 2240 yards. The cost of current and maintaining these 32 lamps for the year 1906 was £951, or at the rate of £750 per mile run, averaging, therefore, £29 14s. 4d. per lamp per annum; while about 75 per cent. of them are extinguished soon after 11 p.m., and two small glow lamps on each arc light column are substituted. The annual cost of the 52 discarded gas-lamps would not have amounted to more than about £200.

Year.	No. of Lamps.			Cost per Lamp per Annum.			Total Cost of Public Lighting.	Increase over 1902.
	Gas.	Incandescent Electric.	Electric Arcs.	Gas.	Incandescent Electric.	Electric Arcs.		
				£ s. d.	£ s. d.	£ s. d.	£	£
1902	565	Nil.	Nil.	3 18 8	Nil.	Nil.	2223	Nil.
1903	549	48	30	3 18 9	3 14 0	32 5 1	2279	56
1904	486	60	30	3 16 2	3 13 1	27 16 4	2881	658
1905	456	95	33	3 19 10	3 13 2	28 8 8	3098	875
1906	438	118	39	4 0 1	3 13 5	27 7 2	3126	903

Lighting hours for gas taken at 3760 per annum.

The figures for 1907 are not yet obtainable. The borough accounts are made up to the 25th of March in each year; but it is not until about the Christmas following that they came into the hands of the public (there is considerable diplomacy in this by the bye). There is a strong possibility, however, that the increased cost of public lighting for 1907 will be well above £1000 over that of 1902, of which sum not more than about £200 would represent extensions. The total extra cost, therefore, to the ratepayers of Gravesend on their public lighting account would amount to some £3492 during the five years, or about £2700 if extensions are allowed for. I should here state that the gas-lamps are under the direct control of the Corporation, who light, extinguish, clean, and maintain them; the Gas Company merely supplying gas to the base of the lamp, for which they charge 50s. per lamp per annum. The cost of maintenance is very high; but for this we are not responsible.

It is not my intention to deal with the Corporation electric department in any detail in this address. It may, however, interest you to know the progress made financially, so far as one can gather from the accounts. The following is a summary of the net revenue account from the inception of the undertaking:—

Year.	Balance on Net Revenue Account.	
	Surplus.	Deficit.
	£	£
1903	Nil.	856
1904	Nil.	2890*
1905	29	Nil.
1906	786	Nil.
1907	244	Nil.

* It is only fair to state that the large deficit in 1904 was, to a considerable extent, due to an expensive law-suit between the contractor for the buildings and the contractor.

Taken in conjunction with the public lighting, the loss to the ratepayers since the introduction of the Corporation electricity may be fairly taken at about £5380. I think we can fairly claim that the profits are simply being made at the expense of the public lighting, to say nothing of the amount taken for the lighting of the municipal buildings over and above that paid for the same light for gas. This state of things is, however, not confined to Gravesend; for on inquiry I found in some twenty towns of about our own size where electricity is used for public lighting, the profits shown on the undertakings were gained in this way.

There is another matter that I think I ought to mention in connection with our electrical undertaking, and accounts again for these so-called profits. The assessment of the property must be ridiculously low as compared with the Gas Company's, as the following figures show:—

ELECTRICAL UNDERTAKING—	
Capital expended to March, 1907	£63,726 0 0
Rates and taxes for year 1907	79 11 8
GAS COMPANY—	
Capital expended	£95,203 0 0
Rates and taxes for year 1907	958 0 1

or, if we take it on the gross revenue account—

ELECTRICAL UNDERTAKING—	
Gross revenue	£4029 16 3
Rates and taxes	79 11 8
GAS COMPANY—	
Gross revenue	£7300 10 11
Rates and taxes	958 0 1

If the electrical undertaking paid rates and taxes equivalent or *pro rata* with those paid by the Gas Company, they should be paying, if taken on the capital expended, £641 instead of £80; while if on gross revenue, the amount should be £527, instead of £80. Taking these figures as a rough basis, it will be seen that the ratepayers here are again losing considerably, to the benefit, of course, of the electricity consumer.

Before leaving the subject of electricity, attention may be drawn to the osram lamp, which is shortly to be placed on the market, and of which our electrical friends are somewhat jubilant. About two months ago some startling statements were made concerning this lamp in certain of the London daily journals, which, from their simultaniety and similarity, caused us to think emanated from no disinterested person. That this lamp is an improvement on any existing electric incandescent lamp is, I suppose, beyond doubt;* but Mr. J. H. Canning, in his paper read before the Welsh Institution, has conclusively proved, from experiments made with the osram lamp and an incandescent gas-burner, that the latter is far and away the cheaper and better light.

There are many matters of importance I should have liked to have touched upon had time permitted; one of these being the Workmen's Compensation Bill, which came into force in July last. As this matter is now in the hands of an Investigation Committee of the Institution of Gas Engineers formed for the purpose of inquiring into and, if possible, reducing the high and anomalous demands of the Insurance Companies, nothing further need here be said. I have often thought that if all the Gas Companies would band themselves together, ways and means could be devised for self-insurance.

One word as to the exhibition which will shortly be opened in Manchester, under the auspices of the Manchester Institution of Gas Engineers, and which we all wish every success. This exhibition appears to have met with such a hearty and liberal response from manufacturers and others that the exhibits are not only likely to be large but new and particularly interesting.

In conclusion, I would speak of the good this and kindred Associations do in the transmission or transference of thought and practice in our profession. To the outside world these meetings may appear to be as nothing, to us, however, they are of great advantage and importance when dealing with our successes and failures, and our industry generally, as well as to the advantage of those under whom we serve; for, as Ruskin says, "Such help as we can give to each other in this world is a debt to each other, and the man who perceives a superiority or a capacity in a subordinate and neither confesses nor assists it, is not merely the withholder of kindness but the committer of injury."

RETORT-HOUSE GOVERNORS—OIL-GAS TAR FOR ROADWAYS.

At the close of the address,

Mr. THOMAS GLOVER (Norwich), in proposing a vote of thanks to the President for his admirable address, said the members had listened to it with very great pleasure indeed; and he was sure they all felt it was worth the trouble they had taken—if trouble it was—in coming to Gravesend, to listen to Mr. Davis's review of the position of the gas industry. He was certain the members would agree with many of the statements in the address, and particularly would they all admire the sentiment: "Threatened industries, like men, live long, and gather fresh vitality from the strenuous struggle for existence." They all felt that that was quite true. Then, further on, the President said that the competition of electricity had been the means of quickening the nerves and strengthening the vitality of their industry. They had plenty of evidence of that; and Mr. Davis had voiced the position very well indeed. Some one had whispered behind him "What about horizontals and inclines ending in a dead-heat?" That might, of course, be taken in more ways than one. But he did not think it was in Mr. Davis's mind that they had got down to dead-heats, but that the results from the two systems, as they now knew, had come out pretty close. He thought that it must be exceedingly gratifying to the Association that in these days every President seemed to mention the advantage of retort-house governors. It might perhaps be remembered that the interest given to the use of retort-house governors arose from a paper read at one of their meetings, and the general use of the retort-house governor started from that day. It was most gratifying, as Mr. Davis had said, that the results obtained in gas-works had been increased by the greater attention that had been given to the question of the condition of the seals, of the hydraulic, and of the foul mains, and to the pull on the retorts. These improved results had been obtained almost throughout the country. He had recently had an opportunity of looking through some analyses of gas-works accounts; and he saw that carbonizing makes had been flowing steadily up, and in that course of events retort-house governors had played an important part. In the address, the President had touched upon almost every important topic of current interest. Another general one was the use of tar on roads. It was interesting to see that Mr. Davis had been making experiments with water-gas tar, as he (Mr. Glover) was entirely in favour of the treatment of roadway surfaces by water-gas tar; and he could tell the members that all their stock of water-gas tar had this summer gone on the Norwich roadways, and with very good results. He hoped the experience at Norwich which had been so beneficial would also be the experience of others. It was not good taste to traverse the President's address; but, as he had to propose the vote of thanks, he thought he might just touch on these two or three points.

Mr. JOHN BARTON (Peterborough), in seconding the motion, remarked that he hoped those members who had not joined the Commercial Sections of the Association would do so at once.

The motion was carried with applause.

The PRESIDENT, in response, said the enthusiastic manner in which the vote had been carried had amply repaid him for the little trouble he had taken in the preparation of the address. The members being satisfied, he was also.

PLACE OF SPRING MEETING.

Mr. F. PATERNOSTER (Felixstowe) said he wished to propose that the next meeting be held at Felixstowe; and he was instructed by his Directors to say that they would give hearty welcome to the Association should they hold the meeting there next April.

Mr. J. S. DOUGALL (Boston, Lincs.) seconded the motion, which was cordially agreed to.

A PRESIDENTIAL SOUVENIR.

Mr. R. G. SHADBOLT (Grantham) remarked that for some time past he had felt, and he thought others had done so too, that gentlemen who occupied the position of President in this and kindred Associations ought to be presented with some little souvenir of their year of office. The form it should take was to his mind immaterial. They had sufficient, and more than sufficient, funds for this purpose; and he thought the time had come when they might well mark the event by presenting their Presidents, at the end of their term of office, with some such little souvenir as he suggested, which would serve to pleasantly remind them of their year of office. He therefore moved that it be an instruction to the Committee to take into consideration the advisability of presenting some such memento or souvenir to their retiring Presidents, commencing with Mr. Brockway. The souvenir might take the form of a medal (with a suitable inscription) for the watch chain.

Mr. F. PRENTICE (Ipswich) seconded the motion; remarking that he hoped it would meet the approval of the members, and that Mr. Brockway and future Presidents would receive the souvenir as but a faint indication of the appreciation by the members of their services.

The proposition was unanimously carried.

THE ALLOWANCE FOR DEPRECIATION.

Mr. J. CARTER (Lincoln) said there was one matter he should like to mention at this meeting, though perhaps it would come more properly under the notice of the Commercial Sections. During the past twelve months or so, he thought any observer of events in gas politics must have been struck with the growing disorder and confusion around that highly interesting and important question—the allowance for depreciation of plant when gas undertakings were assessed for income-tax purposes. He supposed most of them adopted the usual practice of charging repairs and renewals to revenue account; and these charges might total up to 2½d., 3d., or 4d. per 1000 cubic feet, as the case might be. But it was no secret that in some parts of the country a distinct percentage was allowed, in addition to the ordinary charges that figured in the accounts year by year. If it could be an instruction from the meeting to the Commercial Sections to go thoroughly into this question, and to get together all the information available, so that every member might have the full information, he thought the investigation would result in substantial relief to the various gas undertakings represented.

Mr. R. G. SHADBOLT agreed that this was a matter that came within the scope of the Commercial Sections; and, considering that Mr. Carter was Chairman of the Western Commercial Section of the Association, it was strange he should appeal to the general body of the members for assistance in work that was under his own particular direction. He (Mr. Shadbolt) quite appreciated one thing with regard to this matter—that was, that every member of the Association was not a member of the Commercial Sections; so that after all there was perhaps "method" in Mr. Carter's "madness."

The PRESIDENT took it that Mr. Carter simply wanted the instruction of the members to pursue inquiries into this matter, so that the inconsistencies of which he spoke might be rectified. He (the President) was sure the members would grant this most

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See "JOURNAL," Vol. XCIX., p. 697.

willingly. He would impress upon all the members to take a greater interest in the Commercial Sections; and then perhaps they would get more knowledge of such matters as the one to which Mr. Carter had drawn attention. If there were ways and means by which companies could take greater advantage of depreciation, they should do it. Corporations did it very largely. He thought they might leave it to the Commercial Sections to go further into the matter.

Mr. BARTON: Will the two Sections report to a meeting of the Association on the matter?

The PRESIDENT: I think that is the meaning of Mr. Carter's proposal.

The suggestion was thereupon agreed to.

This concluded the business before the meeting.

The Telpher System of Handling Material.

In the course of the President's Address, he referred to the "Telpher" systems, of Messrs. Siemens Bros. and Co., for handling material. At the close of the meeting Mr. Percy Brookes explained the working of the system to those members who were interested; and he also distributed the following description of the "Telpher" line at Blackburn Gas-Works.

This line has been installed for the purpose of handling coke from the retort-house to the coke-store—a maximum distance of 240 feet. Owing to the impossibility of erecting intermediate supports at short intervals, the line is divided into five spans—three of 60 ft. each, one of 30 ft., and one of 32 ft. To carry the line over the three long spans, three girders have been erected; and to the underside of these girders, the hangers for supporting the track are secured. The track itself is a 9 in. by $3\frac{1}{2}$ in. bulb angle, weighing 24 lbs. per foot. A double trolley line is installed, and attached by means of brackets to the girders.

The telpher consists of a main carriage, fitted with a single motor, which works either the running wheels or the hoist by means of a clutch—the running wheels being driven by a triangular chain drive. A cage for the attendant is provided and fitted with the controlling gear for running and hoisting. To the carriage is attached a trailer, to carry one of the pulleys for the hoisting-rope. The running speed is 300 feet per minute; and the hoisting speed 50 feet per minute. The telpher carries a self-tipping and self-righting bucket, the tipping catch of which is released by the attendant by means of a cord passing into the cage, and working against a balance-weight in the catch. The bucket has a capacity of 15 cwt. of coke.

The bucket is loaded on the floor of the retort-house, and then hoisted and conveyed to the coke-store, where it is lowered to a suitable height, so as to avoid breaking up the coke in falling, and is then tipped by the attendant. The bucket rights itself, and is locked automatically by the tipping-catch. It is then hoisted, and returned to the retort-house, where it is lowered to take another load. An extensive system of telpherage has just been carried out by Mr. Canning at the Newport Gas-Works.

In the evening, the members dined together at the Clarendon Hotel. The Chairman of the Gas Company, his colleagues, and several other local gentlemen were the guests of the Association, and occupied seats to the right and left of the President. It was a most delightful evening; and there were good music and good speaking after dinner.

The following day those members and friends who were able to stay enjoyed a drive through Dickens's country to Cobham Hall (opened for inspection by permission of the Earl of Darnley); and from there they extended the excursion to Gad's Hill. The day was fine; and the outing was much enjoyed.

HIGH PRESSURE DISTRIBUTION:

ITS EFFECT ON THE ILLUMINATING AND CALORIFIC POWERS OF GAS.

During the experiments upon the volumes of gas transmitted at different pressures through the gas-main joining the factory at Riet with the town of St. Gall, in Switzerland, which were carried out during August, 1906, by Dr. Fliegner,* tests were also made under the direction of Herr Zollikofer, the Manager of the undertaking, in order to ascertain whether the passage of the gas in the conditions already described produced any effect upon its calorific and intrinsic illuminating powers. A report upon the latter branch of the inquiry has been printed in the "Journal für Gasbeleuchtung," from which we obtain the subjoined particulars.

A pair of Junkers' calorimeters and two photometers were installed; one of each being situated at Riet, close to the outlet of the blowing engines, and the others near the storage gasholder at St. Gall. The photometer was a Bunsen-Krüss instrument with a Lummer-Brodhun head. During the progress of the six different experiments under pressure and the one (No. 1) under natural draught, measurements of the illuminating power of the gas were made every hour at both ends of the main; three individual readings being usually completed for each test at St. Gall and five at Riet. Hollow-headed flat-flame burners were employed to develop the light. The burners were adjusted so as to consume as nearly as possible 150 litres (5·3 cubic feet) per hour; and the figures obtained were re-calculated for the stated consumption. The two calorimeters were kept running without interruption during the seven different main experiments. Determinations of the calorific values were made every hour at Riet and St. Gall; five being generally finished at the works and four at the holder end of the main during each experiment. Only net calorific value was estimated; but the readings were noted down both before and after reduction to 0° C. and 760 mm. of mercury.

The natural illuminating power of the gas at the works varied from 12·6 to 18·4 Hefners, and that at St. Gall from 14·0 to 18·4 Hefners. Its uncorrected net calorific value varied at the works from 534 to 575 B.Th.U., and at the gasholder from 531 to 628 B.Th.U. per cubic foot. On averaging the mean observed barometer readings during the seven complete experiments, the mean height of the mercury was found to be 20·5 mm. higher at Riet than at St. Gall; corrections for vapour tension, temperature, and capillarity increasing the difference to 20·6 mm. This difference was equal to 2·7 per cent. of the pressure at St. Gall, causing 100 parts by volume of gas at Riet to occupy 102·9 volumes in the high-level holder at the same temperature. The photometric readings were not corrected for equal barometric height and equal temperature, because the primary object of the entire investigation was to study the properties of the gas as it actually existed and in the conditions in which it arrived at the place of consumption.

—	IV.	I.	VI.	V.	II.	VII.	III.
Mean pressure at engine outlet (tenths) . . .	55·1	56·4	101	152	206	307	445
Change in original illuminating power per cent.	−1·0	+5·9	−6·0	−6·0	−2·6	−2·8	−2.5
Change in original calorific value uncorrected per cent. . . .	+1·9	+3 1	+1·8	−0·5	+2·8	+4·0	+1·9
Change in original calorific value corrected per cent.	+4·1	+4·9	+3·0	+2·5	+4·2	+6·8	+4·8

The general results of Herr Zollikofer's tests are reproduced in the accompanying table, where the seven experiments are arranged (as in Dr. Fliegner's article) in order of increasing pressure. The third horizontal line shows the average change in illuminating power of the gas in each experiment after its arrival at St. Gall expressed as a percentage of its original illuminating power at Riet. In experiment No. I., where the gas travelled upwards without mechanical assistance, it actually exhibited an increase in illuminating power equal to about $\frac{3}{4}$ Hefner; but in the other experiments it decreased a trifle, though the falling-off was too small to be of practical import. It is possible that a slight drop in illuminating power may occur regularly when gas is forwarded through a main in the conditions prevailing at St. Gall; but this is a matter that can only be decided when the consumption has become large enough to necessitate a blowing engine being run continuously at such speed as to give a pressure of at least 100-10ths.

The last line of the table represents the change in the net calorific value of the gas after reduction to standard conditions. It will be seen that in every instance the gas gained in heating power by passage through the main; but the differences did not vary regularly with the pressures. The fourth line shows the analogous differences before reduction; and it will be noticed that a loss of calorific power occurred in experiment No. V. Just before experiment No. V. was begun, the gasholder at Riet blew, and gas was therefore passed very rapidly into the holder at St. Gall which was supplying the town. It seems possible, therefore, that some of the constituents of the gas forwarded during the earlier experiments which had deposited in the main and would in the ordinary way have raised the calorific value of gas No. V., were partially carried forward by the rush of gas into the holder whose contents were not investigated, whence they travelled at once into the distributing system of the town.

In general, it may be said that the high-pressure transmission of gas at different pressures, and under varying pressure, does not decrease the calorific value. Some of its constituents appear to condense and to be volatilized again afterwards. But whether this would involve loss of heating power when the gas was forwarded continuously at high speed for a long time, cannot yet be told. It would, however, seem that no really prejudicial effect is to be anticipated.

* See "JOURNAL," Vol. XCIX., p. 826.

We regret to learn that the Town Clerk of Birmingham (Mr. E. O. Smith) has lately been suffering from nervous breakdown, which has necessitated complete rest. Though his condition has lately improved, it is scarcely expected that he will be able to attend the first meeting of the Council this month.

NOVELTIES FOR THE HEATING AND LIGHTING SEASON.

IN THE GAS-HEATING SECTION.

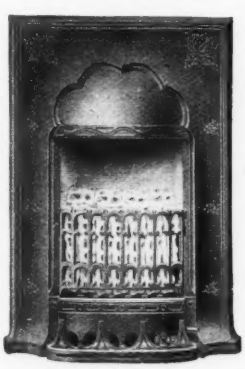
(*Continued from Sept. 24, p. 835.*)

Messrs. John Wright and Co.

To Messrs. John Wright and Co. one naturally looks, season by season, for fresh light and leading in gas consumption appliances; and this year they have maintained their reputation, having set themselves to strengthen the gas manager's hands by a most interesting and varied programme of new apparatus for the season.

The "Wizard" gas-fire of the firm, which made its *début* last year, soon created for itself a notable demand; and it is hardly surprising to find so successful a stove is this year followed by a smaller-sized "Wizard," with an 8½-inch fire. Although it is an exact replica of last year's fire, and only slightly less in size, the price, we find, is considerably lower.

There is novelty in the firm's new designs for the season. One fire which will be particularly interesting to experts is the "Mascot." Like the "Wizard," it has stepped well out of the old rut in design. It is a square-topped stove, and is made in two sizes—viz., with 10-inch and 8½-inch fire. It embodies all the latest of the firm's improvements—the shallow and projecting fire, the single row of fuel, their "Simplex" removable brick-and-fuel arrangement, with gas and air adjusters. The two "Wizards" and the two "Mascots" have their burners, bricks, and fittings interchangeable in each size, as formerly, where the fires are of equal fire-width. In these new patterns, the firm's rule of making the burners so that they can be connected up from right or left has also been followed.



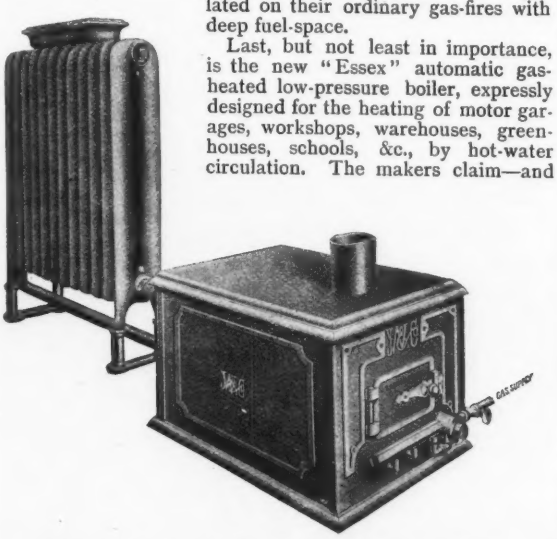
The "Mascot" Fire.

The "Prospero" Fire.

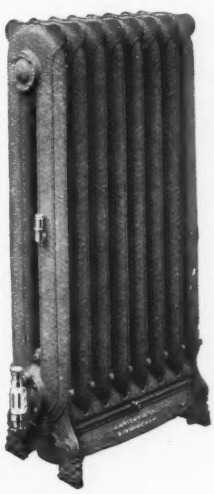
Messrs. Wright and Co. are also bringing out a gas-fire of the same class as their "Junior" of last year. It has been named the "Prospero;" and in its best black or aluminium finish, it is indeed a very dainty little fire. It has all the advantages of the "Simplex" arrangements. It is convenient here to mention that most of Messrs. Wright's gas-fires can be had in a large assortment of different colourings of porcelain enamel finish.

The welcome accorded the "Simplex" gas and air adjuster, has led the makers to introduce this season a further fitting—the "Amplex." It is an adaptation of their "Simplex" adjustment, and enables the gas and air to be regulated on their ordinary gas-fires with deep fuel-space.

Last, but not least in importance, is the new "Essex" automatic gas-heated low-pressure boiler, expressly designed for the heating of motor garages, workshops, warehouses, greenhouses, schools, &c., by hot-water circulation. The makers claim—and apparently not without good reason—that the "Essex" type of gas-heated boiler, is an entirely new move in developing the uses of gas in fresh directions. Inspection shows it to be a thoroughly engineer-like job. It is built up in cast-iron sections, with machined metal-to-metal push nipple joints—precisely the same principle as in the "St. Andrew" radiators. It is so contrived that the radiator connected to it can be placed on practically the same level as the boiler; so that there is no need either to sink the boiler into a pit beneath the floor, or raise the radiator halfway up the wall of the building. A pair of 6-inch stilts are all that is needed. The apparatus is fitted with Messrs. Wright and Co.'s patent automatic gas-valve, which has all along been a feature of their hot-water apparatus, and has also an air-adjuster; and so effectively do these contrivances modify the gas consumption, that we are informed the cost of running the boiler is cut down to a surprising degree. Every detail in the apparatus appears to have had its share of attention; and besides departmental tests, each boiler undergoes a final workshop test of 120 lbs. to the square inch. Like the "St. Andrew," this apparatus needs little attention, and that only in the form of a little water once or twice in the season. "Essex" hot-water circulating radiators, to be used in conjunction with the boiler, are also listed. The "Essex" boiler would seem to fill quite a vacant place as regards the heating of motor garages, and the various classes of buildings for which it is intended.



The "Essex" Automatic Gas-Heated Low-Pressure Boiler.

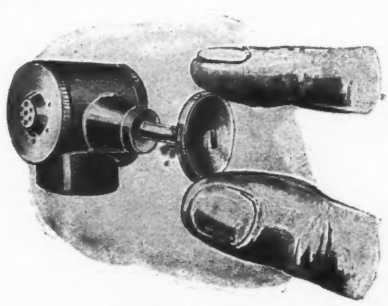


"St. Andrew" Gas-Steam Radiator.

It is evident that in the "St. Andrew" radiators, the firm have once more been striving "to make perfection more perfect still." This season Messrs. Wright have designed special dust-proof caps for the water-gauge fittings; and the glass portion of the gauges is protected with nickel-plated steel shields. They are also adding their patented air adjustment to all the "St. Andrew" radiators they send out. The firm tell us they are prepared for a record season, and have thousands of the radiators in stock, ready packed for despatch.

R. & A. Main, Limited.

In connection with the demand which has arisen for gas and air adjustment in gas-fire burners, practically all makers have departed from the burner with double injector, and adopted a burner with a longer mixing-tube and a single injector. It is pointed out by Messrs. R. & A. Main that the hitherto universal adoption of a double injector in gas-fire burners was due "to the recognition of the fact that, by means of this double injector, a livelier, sharper flame of intense heating power was secured, rendering the fuel more highly incandescent, with the result, of course, of securing a brighter fire." From their long experience, Messrs. Main hold the opinion that the result of lengthening the mixing-chamber of a gas-fire burner and adopting the single injector is to soften the flame, and reduce the brilliancy of the fire. They have, therefore, in designing their new patent adjustable burner, retained the advantages of the double injector, and have been able, after some difficulty, to attain this end in a very simple and ingenious manner.

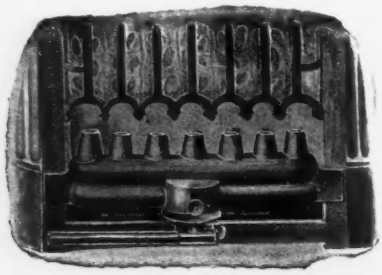


The Double Injector.

The first illustration shows the double injector, with simple gas adjustment operated by one screw; and the second illustration shows the injector in position in the fire, with the air-adjusting disc attached. By means of this, of course, the burner can be perfectly regulated to any varying quality of gas or pressure.

As a leading line in the slot type of fire for the coming winter, Messrs. Main have brought out the "Worcester," which is also illustrated. It is not necessary to comment upon this design, as readers of the "JOURNAL" can form their own impression of it.

The sizes are 21 inches wide by 27 inches high with a 10-inch fire, and the price is only 25s. It is of importance to observe that the gas and air adjustment is completely hidden from view, and



The Double Injector in Position.

is also safe from the careless handling of servants or children who may have a tendency to disturb the regulation of a burner. When the fitter has completed the installation of the fire, and perfectly adjusted the gas and air, the fender is fixed on with the two screwed knobs shown; and there is nothing to call attention to the fact that any adjustable arrangement is attached to the fire. It also does away with what some people may regard as the unsightly appearance of exposed adjustable connections. The gas supply is reversible for right or left hand connection.

The "Worcester."

It will also be noticed that the fire is of the shallow type, and is exceptionally high, in order to retain to the utmost extent the heating power of the gases. The greatest care has likewise been taken to ensure a more than ordinary projection of the canopy, so that no fumes can escape otherwise than by the flue. In the recent exhaustive tests of gas-fires, it was amply demonstrated that a shallow fire of such a construction as the "Worcester" gave higher heating results than the deep form of fire. To meet these requirements, Messrs. Main have arranged this season to supply their more popular patterns either as shallow or deep fires. At the same time, it is the firm's opinion that it will probably be found, after some experience, that the public will still prefer the old type of deep fires.

With regard to gas consumption, Messrs. Main prefer that their fires shall not be restricted in power and operation. They therefore supply fires capable of burning 20 to 24 cubic feet per hour, but which can easily be reduced, if desired, by means of their gas and air adjustment to 15 feet. The "Worcester" fire is such, and can be supplied to burn from 15 to 25 feet per hour.

A pattern which has special advantages, and has proved extremely popular, is the "Scarborough," which is shown in the accompanying illustration. This is a combined fire and cooker. It will be seen there is on top a grill and boiling-burner; when not in use, the grill is covered with an ornamental fret, and is not visible.

Messrs. Main have also brought out an elegant design of radiator—the "St. Mungo." It is made in three heights, either plain or ornamental design, and embodies all the latest points in radiator construction, such as fixed cast-iron base, gas and air adjuster, adjustable coupling, sensitive diaphragm valve, nickel plated air-valve, and the gauge glass fitting made with a guard.

All the designs of gas-fires are finished, when desired, in a very fine quality of porcelain enamel, for which the firm have already a high reputation. In this connection, it may be mentioned that a new series of porcelain enamel colours has been prepared; and this embodies a number of entirely new shades.

The "Scarborough" Combined Fire and Cooker.

Messrs. Arden Hill and Co.

Special new and excellent features are found in the goods which Messrs. Arden Hill and Co. submit for the coming season, each one of which features will well repay close attention by those interested. The firm are introducing a new type of gas-fire—"The Radium." The selection of the name alone is an attraction; but in the chaste nature of the design we have a fire that is worth attention. The "Radium" is made in two sizes, with 8½-inch and 10-inch fire respectively. All parts of the fire are removable for cleaning or renewal. The "Radium" has a projecting fire, with a single row of fuel, patent removable fire-brick and lining and patent gas and air adjusters.

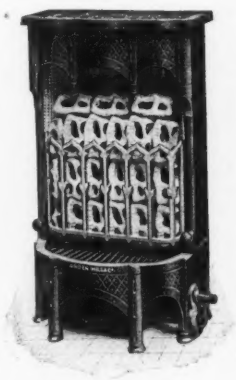
The "Radium" Slot-Gas-Fire.

The "Bruno."

Quite a fresh interest attaches to the "Bruno" stove, which has been designed for the heating of such places as brewers' cellars, public-house vaults, stores, &c. The construction of the stove is most suitable for this class of heating; and it has a white flame, and requires no flue.

A fire that will attract great attention and defy adverse criticism, is the new "Claro." The design is exceptionally good and attractive; and it is not easy to decide whether the fire really looks better in the black enamel or in aluminium finish. In the "Claro," all Messrs. Arden Hill and Co.'s latest improvements are found. It has a shallow and projecting fire, the width of which is 8¼ inches. It has patent removable fire-brick lining and gas and air adjustment; and the cost of the fire is very low.

This year, in addition to the "Simplex" gas and air adjusters, a fresh contrivance—the "Amplex"—is shown by Messrs. Arden Hill and Co., which enables the same adjustment to be made on the firms' stoves, with deep fuel space, where customers prefer this type of fire.



The "Claro" Fire.

The "Lumen" Radiator of Four Units with Ornamental Top.

There is every indication that a large business is going to be done this winter in gas-heated radiators; and a glance round the "Acme" works indicates the great preparations which are being made to grapple with the demand upon an adequately large scale. Several important improvements will be found in the "Mars" gas-heated steam-radiators, which, we understand, have grown in popularity since they were introduced several years ago.

This year Messrs. Arden Hill and Co. are introducing an up-to-date luminous-flame radiator—the "Lumen" it is called; and it is constructed on the well-known sectional principle, which will prove particularly suitable for standing in the centre of halls, shops, &c. There is a demand for this particular style of radiator, which is made throughout in cast iron, and is flueless and non-condensing. The heating power is under perfect control, as each unit has its separate burner and tap. It will be noticed from the illustration that each single unit is a complete stove in itself; and any number of these units can be fixed together so as to form a radiator. The "Lumen" is made in two heights—36 inches and 30 inches—and is finished in either black or any of the firm's porcelain enamel finishes. An ornamental cast-iron top is offered for use with the radiator where desired.

IN THE LIGHTING SECTION.

(*Continued from Sept. 24, p. 838.*)

Messrs. Evered and Co.

In the extensive London show-rooms in Drury Lane of Messrs. Evered and Co., there is to be seen a magnificent display of high-class gas-fittings of such diversified character that they are quite beyond anything but general treatment. Directly we are introduced here to the newest designs in fittings, we are once more confronted with the fact that the inverted burner—both large and small—has really produced a revolution in the style of fittings, and has given a latitude to design that the workers in this line have never before possessed. We admit, and do so with the utmost freedom, that the fittings for electric bulbs were the precursors in new fashions in fittings for the bijou type of inverted gas-burner. Messrs. Evered tell us that the demand now for special and high-class fittings for the inverted burner has left very much in the rear the demand for fittings for the ordinary type of incandescent burner. This is only what we expected, and predicted would be the case; for inverted burners, especially in the small sizes, are so amenable to artistic treatment, that a complete change in idea and requirement appeared positively assured. It has all come to pass; and the makers have not by any means been found wanting. Here we have in these show-rooms, numerous forms of pendants, brackets, and hall lights, of such variegated feature that the difficulty is to know upon which one's choice could be fixed as showing any decided preference over the others. In looking at the suspension fittings, we learn that silver and copper antique are the two finishes that are now in strongest demand, both for ornamental appearance, and because they are more suitable for the inverted light, for which polished brass is not so usefully applicable, and therefore not in such great request. These pendants, for single or more lights are real works of art; and the same may be said of the brackets. In one show-case, there are seen, rich in artistic merit, brackets, fitted with bead fringes and shades, both large and small, for the inverted light; and they have the full appearance of the electric light, with the exception that the light itself is stronger. These brackets are made and fitted for single or cluster lights; and their effect is highly pleasing. Then for hall lanterns, there are designs, quite unique, and which take the fancy immediately the eye falls upon them. They are made in several patterns—some with leaded glass æsthetic in character. Those for inverted lights are made with the bottoms completely open, so that there shall be no impeding of the light. These lanterns appear to be mostly finished in armour bright; and the designs of some of them are quaint, and, with their beautiful finish, are highly decorative. There is very little call now for the black finish in wrought-iron fittings. It is to a large extent the armour-bright fitting that obtains favour. For vestibule lights, there is quite a new style with upright and fancy cylinders for the vertical incandescent burner.

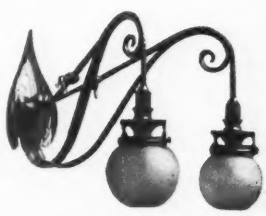
New Types of Brackets for Inverted Gas-Burners.

These are very effective; and—showing how approved fashions in gas-fittings alter as in other things—it may be said that the old square lantern is now entirely out of the running. The bijou inverted burner, too, has caused a revival in the demand for art figures for holding burners; and some charming work is to be seen in the show-rooms. The figures are of French origin; and are increasing in demand. Those providing for the support of two and three lights look exceedingly well. Lamps specially made for silk or other shades are plentiful; and the shades themselves are works of art.

James Milne and Son, Limited.

Looking into the Farringdon Road show-rooms of Messrs. James Milne and Son, Limited, we get further evidence of the high pitch of perfection the art metal worker has attained in producing fittings suitable for the inverted gas-burner. There are cunningly contrived fittings here which are calculated to mislead the hasty observer into the belief that they are designed exclusively for electric lighting. Pleasing, indeed, to the most refined taste are the chain pattern down-rod pendants, of one of several designs of which we give an illustration. These look very pretty with three drooping inverted burners carrying fancy globes. In

Bracket, in Adam Style, with Patent Combination Tap.



A Pretty Two-Light Bracket.

the various patterns, the circle of the three lights is made to 14, 16, or 18 inches diameter. We regard these as excellent pieces of workmanship; and they are highly ornate in oxidized copper or oxidized silver, for which the demand is very considerable. These pendants only represent one of the newest characteristics

of the firm's patterns in this line. Wherever one goes just at present, it is found that, in all directions of decorative work, the Adam style is being revived; and in both the pendants and the brackets shown by the firm, this style for the current season predominates in the best of the fittings. We must say that it befits well the modern light styles of furniture. This form of decoration is seen in one of the brackets illustrated. It is the three-light one, which is made with an 8-inch projection, and 5 inches between

The Patent Chain Down-Rod Pendant (Adam Decoration).

the lights. But there is a point about this fitting that is worth particular notice. Instead of having a tap on each arm, one single ornamental knob tap in the centre controls each light separately, or all three. On the barrel of the tap is fixed a little pointer, and on a small plain face at the back of the knob are the figures 1, 2, 3. If only one light is required the pointer is placed on the 1; if two lights, on the 2; and if three lights, on the 3. This combination tap can be fixed to brackets carrying two or more lights. The other bracket illustrated (merely an example of many) is also of pretty design. It has a 9-inch projection, and has 9 inches between the lights. Brackets which should obtain large use for drawing-rooms and other artistically-appointed apartments are those with Adam decoration, and finished in French gilt. They have a very choice appearance; and excellent designs in them are shown by Messrs. Milne.

KÖNIGSBERG GAS-WORKS LABORATORY.

The report for the year 1905-6 issued by the laboratory of the municipal gas-works at Königsberg has recently been published in the "Journal für Gasbeleuchtung," and contains some items of interest.

During the year under review, 19 shiploads of coal were sampled and analyzed. The proportion of moisture ranged from 0·78 to 2·15 per cent., of ash from 6·10 to 10·32 per cent., and of dust and dirt from 12·4 to 19·4 per cent. One shipload of Lambton coal contained from 0·44 to 2·94 per cent. of moisture, from 5·30 to 10·94 per cent. of ash, and from 10 to 17 per cent. of dust and dirt. One shipload of Wearmouth coal contained from 1·83 to 2·89 per cent. of moisture, from 3·80 to 11·85 per cent. of ash, and from 9·5 to 19 per cent. of dust and dirt. Twenty-five samples of liquor and three samples of cyanogen press-cake were found to contain from 15·035 to 23·60 per cent. and from 9·04 to 10·065 per cent. of ammonia respectively. The proportion of Prussian blue in the cakes varied from 55 to 65·25 per cent. The ammonium sulphate recovered in working up the cyanogen sludge contained between 23·37 and 25·14 per cent. of ammonia. The gas supplied to the town had the following average composition: Carbon dioxide, 1·85 to 1·98 per cent.; unsaturated hydrocarbons, 1·98 per cent.; oxygen, 0·72 per cent.; carbon monoxide, 10·17 per cent.; methane, 22·26 per cent.; hydrogen, 55·58 per cent. The sulphur in it was equal to 32·5 grains per 100 cubic feet, and the ammonia to 0·393 grain. Burnt at the rate of 180 litres per hour, it developed 11·93 Hefners in the standard argand burner. Its net calorific value was 540 B.Th.U. per cubic foot at 0° C. and 760 mm.; its specific gravity was 0·4301. When examined in the town testing-stations, the gas was found to contain 1·70 per cent. by volume of carbon dioxide, and to possess an illuminating power of 10·54 Hefners.

An experiment was tried to ascertain whether any difference in the illuminating and the calorific values of the gas was made by introducing water gas into the retorts instead of into the hydraulic main. The result was wholly negative. Numerous experiments were also tried as to the expense of raising 1 litre (0·22 gallon) of water from 68° Fahr. to the boiling point in ordinary commercial apparatus by means of different fuels. At the prices ruling in Königsberg [which have been translated on the present basis that £1 equals 20·45 marks]—viz., gas at 3s. 4d. per 1000 cubic feet, paraffin oil at 10⅝d. per gallon, and denatured alcohol at 1s. 9¼d. per gallon, the cost of so doing came out at 0·384 pf. for gas, 0·521 pf. for paraffin oil, 1·118 pf. for alcohol, 0·400 pf. for coal, and 0·390 pf. for coke.

The tests of Feld's wet purification process have been continued; the results showing that the method is quite suited for adoption on a large scale. During the year analysis was made of a deposit met with in the flue of a gas-fire. The material proved to consist mainly of the oxides of zinc and iron.

Some tests have been made upon the carbonization of house refuse. The material was heated in one of four retorts, and the volatile products were passed through one of two fixing chambers charged with coke, in order to reduce the carbon dioxide to monoxide. The conversion of the dioxide was slightly more perfect when the coke was mixed with iron filings; but the advantage so gained was lost by the rapid choking of the vessels. From a long ton of refuse, 3121 cubic feet of gas were obtained, together with 1420 lbs. of solid residue containing 82·5 per cent. of ash and 1·04 per cent. of moisture. The gas possessed a net calorific value of 301 B.Th.U. per cubic foot at 20° C., contained 1·34 grains of ammonia, and yielded cyanogen equal to 52 grains of Prussian blue per 100 cubic feet. The consumption of coke under the retorts was equal to 582 lbs. per long ton of refuse—*i.e.*, 187 lbs. per 1000 cubic feet of gas, an amount which makes the process pay badly.

NEW FELD PROCESS FOR PURIFYING GAS AND OBTAINING PURE BYE-PRODUCTS.

A paper was read by Herr Wählert, of Teplitz-Schönau, before the last meeting of the Bohemian Gas Association describing the new Feld process for the purification of coal gas and the recovery of bye-products in a high state of purity. The process itself has been referred to in our columns on several previous occasions—*e.g.*, in the abstract given in the "JOURNAL" for July 9 last, p. 96, of Herr Kobbert's paper entitled "The True Scope of a Gas-Works."

According to the abstract of Herr Wählert's communication, published in the "Journal für Gasbeleuchtung," the new Feld process is carried out as follows: The mixture of hot crude gas and tar vapours, &c., is cooled as slowly as possible by causing it to pass through vertical chambers which, when special condensers do not form part of the plant, are employed as combined condensers and washers. The vessels are fitted with vertical spindles carrying funnel-shaped receptacles, by means of which the tar that has already been separated out is sprayed against the walls of the washer and so is brought into intimate contact with the passing gas. The first washer and its leading tubes are so jacketed that on leaving it the gas has a temperature of 200° to 230° C.; the whole of the tar, naphthalene, &c., being thereby removed. From the second washer the gas issues at a temperature of 120° to 140° C.; the bye-products in both being recovered in a perfectly anhydrous state. In the third washer, the temperature of the gas is reduced to about 70° C.; roughly 80 per cent. of the water being separated without the elimination of any of the ammonia. The gas then passes through the fourth washer, supplied with ferrous sulphate solution, which extracts 97 per cent. of the cyanogen. In a fifth washer (supplied with gypsum suspended in water), the whole of the ammonia is recovered; ammonium sulphate solution being obtained, which, on evaporation, leaves a salt fit for use as a high-grade fertilizer. The temperature of the gas issuing from the fifth washer is about 30° or 40° C. In coke-oven works, a sixth washer is used, supplied with a heavy tar oil and maintained at a low temperature; all the benzol and similar hydrocarbons being thus extracted.

Herr Wählert expressed the opinion that the Feld process could not without some modification be used on a gas-works, especially one of small size, owing to the variations in the make of gas from time to time. But, nevertheless, the system that enabled Feld to obtain a tar free from water and a gas perfectly free from naphthalene, was well worth attention on the part of coal-gas engineers. A Feld plant of considerable dimensions is in operation at the Wesseln Coke-Oven Works; the results obtained with it having been already described in Herr Kobbert's communication.

Gas-Works Directory and Statistics.—We have received from Messrs. Hazell, Watson, and Viney, Limited, the thirtieth issue of the above-named work. It is for the year 1907-8, and the contents have been revised up to July last. Preceding the statistics are a general index of officials of gas-works and lists of Associations of Gas Engineers and Managers. The contents occupy 448 pages—being a few more than in the preceding issue. The price of the book is 10s. 6d. net.

DIFFUSION PHENOMENA IN FLAMES.

By R. Casaubon.

[**A Paper submitted at the Congress of the Société Technique.**]

In order to define the diffusion phenomena dealt with in this paper, it will be sufficient to refer to the classical experiment in which one gas is placed upon a heavier one. Analysis shows that after a certain time the two form a perfect mixture. Starting from the fundamental hypotheses of the dynamics of a gas established by Bernouilli, M. Violle has given in the "Journal de Physique" the formula for the coefficient of diffusion. It is inversely proportional to the pressure, and directly proportional to the $\frac{3}{2}$ power of the temperature. Some experiments by Loschmidt on the same subject have given results very close to those arrived at by M. Violle on theoretical grounds.

Coefficients of Diffusion.	Calculated.	Observed.
Between H and O	0·720 ..	0·722
,, H and CO_2.	0·528 ..	0·550
,, O and CO_2.	0·163 ..	0·160

Maxwell, starting from new hypotheses on the constitution of matter, has developed a similar formula; finding that the coefficient of diffusion is solely proportional to the square of the temperature.

Setting aside theory, however, the phenomena of diffusion appear to have been very rarely examined in an experimental way. They give evidence of a molecular agitation capable of performing an appreciable amount of work, since it is sufficient to raise the centre of gravity of the total mass of two gases brought together. Without assuming to give here a complete and scientific study of these phenomena, my aim has been to study the part which diffusion plays in the phenomena of flames, and in relation also to the distribution of gases in motion in the air. In contradistinction to other diffusion phenomena, those of flames have been studied by many investigators since the classical researches of Davy; and the views generally held may be summed up in the following short extracts from a modern text-book:—

> Molten fatty matter (we are speaking of a candle flame) rises by capillary attraction in the wick, is vaporized, and combines with the oxygen of the air. In the central portion, where the oxygen obtains access with difficulty, there is a dark zone consisting almost exclusively of carbonized vapours. Next to this is a second zone, in which incomplete combustion takes place; a portion of the carbon being raised to incandescence and emitting light. Lastly, in the outside portion of the flame, the oxygen is in excess, and the combustion is complete.

It is evident that this theory does not account for many things. In particular, it gives no explanation of the fact that oxygen, even in a very small quantity, can penetrate the interior portions of a flame, nor especially of how the temperature rises in these internal zones, since the gases are continually in rapid movement from the inside to the outside of the flame, while, on the other hand, the radiant heat (very low in the case of blue flames) cannot, in a very short tine, raise the temperature of gases of which the absorptive power is not very great.* Experiments to which I shall refer later have been undertaken with the aim of throwing some light on these obscure points.

In the first place, this paper will contain the experimental results from which conclusions which admit of scarcely any doubt have been formed. In the second place, I shall draw from these results certain new ideas on the constitution of flames; and it will be evident that the latter section of the paper contains a large proportion of hypotheses and of personal interpretation of the facts. Lastly, I shall endeavour to discover what bearing the experiments have on the practical side of incandescence.

In the course of these experiments, constant use has been made of a mantle highly charged with cerium. This latter forms a most valuable means of investigation, and it will be well to commence with a brief study of its properties, which will be now described in the following notes.

Properties of a Mantle Rich in Cerium.

The light reflected by a cerium mantle below 700° C. is a dull white, above 700° C. it is yellow, in both a reducing and an oxidizing medium. About 800° C. the mantle emits a light which is brightly red in a reducing medium and white in an oxidizing one. Oxide of cerium possesses the very special property of decomposing at a comparatively low temperature certain heavy hydrocarbons. If a cerium mantle is placed in a glass tube which is moderately heated, and if a current of ethylene, acetylene, and finally of hydrogen or carbonic acid charged with benzene vapour, be successively led into the tube, it is found that the mantle blackens on the passage of the acetylene and the benzene, but is not affected by contact with the ethylene. Under the same conditions, ordinary coal gas gives very rapidly and sharply the same deposit as acetylene and benzene. It must therefore be concluded that the oxide of cerium does not act on the ethylene, but causes a partial decomposition of the benzene and the ethylene.†

Working at temperatures which increased progressively, it was found that the decomposition was quite appreciable at about 170°, and became more and more rapid as the temperature rose to 700°, at which it suddenly stopped.

If a point of the mantle is kept at the temperature at which sodium commences to turn the bunsen flame yellow, this point remains absolutely white; and then the neighbouring points, less directly heated, almost instantly obtain a black deposit. This deposition of carbon, when previously effected on a mantle, disappears when 80 per cent. of air is introduced into the gas traversing the tube, and if the temperature rises from 700° to 800°; but diluents such as carbonic acid and hydrogen have no action on this reaction, unless it be to render it a little slower. On the other hand, air very quickly reduces the intensity of the deposit, and stops it completely when it reaches the proportion of 100 per cent. Oxide of thorium behaves very much as oxide of cerium, but less intensely. The deposition of carbon does not commence until a temperature of 300° has been reached.

The cerium mantle is a valuable aid to the study of a flame. It will be obvious, from what has been said, that the mere appearance of a flame cut diametrically by a plane surface obtained by unfolding a cerium mantle, will give most valuable information. Working in the dark, a first examination will show, from the colour of the light emitted, which are the oxidizing and which the reducing zones. At the base of the flame the deposition of carbon from the decomposition of the hydrocarbons will be noticed. The points where this deposit does not form at all are at a temperature lower than 150°.* The points where it ceases to form are at a temperature above 700°. The regions of the deposition of carbon thus give curves of equal temperature for 150° and 700° respectively. In the hotter portions, useful indications can be obtained as to the relative temperatures of different parts of the flame, if use is made of an external source of light—for example, an incandescent burner. As in the case of all bodies, the quantity of light emitted by one point in a cerium mantle increases with the temperature, and no attempt is made here to deal with the laws of this increase, since the experiments are comparative. If, however, the surface of the cerium mantle is illuminated from the external source, and if the latter is brought successively nearer and nearer, the quantity of reflected light will increase progressively. Each time that the intensity of the reflected light at a single point of the cerium mantle exceeds the intensity of the light emitted, the yellow colour of the light reflected above 700° will be substituted for the red or white colour (according as the portion is oxidizing or reducing) of the emitted light. The result is that in bringing up the external light source the different portions of the cerium mantle will be seen to appear yellow as the temperature rises.

In using the mantle for studying the different portions of a flame, it is convenient to unfold one in order to obtain an approximately flat surface, and support it between two small metal armatures fitted with asbestos. The mantle is next saturated with a solution of nitrate of cerium applied with a brush; and the whole is suspended above a flame, so as to evaporate the excess of liquid. It is then heated strongly in order to convert the nitrate into oxide. When it is desired to observe only the transformations from an oxidizing to a reducing flame, it is best to use a weak solution (1 to 2 per cent.) of cerium; but when observations of the different regions of the flame are to be made in respect to changes in colour, it is best to employ a more concentrated solution (30 per cent.).

Diffusion Experiments.

Turning now to the investigation of the diffusion of atmospheric gases into a stream of ascending gas, an ordinary open gas-flame was cut diametrically by the cerium mantle, and a constantly increasing proportion of air admitted. It was seen that the thin, white aureole which surrounds the flame increases in size little by little at the expense of the dark red internal portion. The latter is steadily reduced in height, still retaining a perfectly regular shape, and finally disappearing when sufficient air is admitted for the complete combustion of the gas.

If, instead of working in free air, the experiment is carried out within a glass cylinder provided with an upper aperture of 15 mm. for the outlet of the burnt gases, the flame is seen to burn at first entirely on the outside. As soon as the proportion of air reaches 350 per cent. (a little more or less according to the speed of the gas), the flame descends into the glass cylinder, and the mantle becomes entirely dark red without any bright aureole. There is no change from this state as the primary air is increased; but at the precise moment when it reaches the proportion corresponding to complete combustion, the mantle suddenly changes over its entire surface from red to white. There is only one way of explaining these results, and that is to assume that in the first experiment the external air penetrates by ordinary diffusion through the film of burnt gases, animated, however, by a rapid upward movement in order to reach the central red zone. Moreover, the fact that this central zone decreases steadily in proportion as the primary air is increased, and that this takes place whatever the speed of the gas, proves that the latter is penetrated by a certain volume of diffused air almost instantaneously on its

* The absorptive power of the hydrocarbons is considerable; but that of simple gases, particularly hydrogen, is *nil*. One cannot imagine, therefore, in the flame of hydrogen, internal zones being heated by radiation from the external zones.

† This study has been limited to the points absolutely necessary in order to investigate the phenomena apparent in flames. It does not pretend to explain the mechanism of the action of the cerium nor to give a complete list of the hydrocarbons on which it acts.

* These temperatures for the commencement and end of the deposition cannot be regarded as absolutely precise. Dr. Gustave Lebon has shown that the gases of flames are strongly ionized. Their radio-activity proves that they are carriers of a quantity of energy which can appreciably affect the points of origin of reactions.

issue from the burner. The speed of the diffusion must therefore be considerable.

As further proof, and in order to better emphasize the process, the following experiment was made: At the bottom of the metal gallery which supports the glass cylinder in the apparatus above described, a three-way or four-way tube, closed by a cock, was soldered. A mixture of air and gas, in which the air slightly exceeded that necessary for complete combustion, was ignited at the burner. The cerium mantle was perfectly white. If at this moment a fairly slow current of gas was admitted by the lower tube, supplying burnt gases in place of the neutral atmosphere, the mantle was seen to change suddenly from white to red. On gradually increasing the supply of air to the bunsen burner, precisely the reverse of the phenomena observable in the free air were seen—that is to say, a white inner zone surrounded by a red aureole increased in height in proportion with the augmentation of the primary air. It can be shown that the diffusion takes place quickly enough to cause an upward gaseous current, if the process is not carried out too rapidly. For this, it is sufficient to remove the metallic fitting which obstructs the passage of the hot gases at the outlet of the glass cylinder. On igniting at the burner a rather small current of gas and air containing a slight excess of gas, the same appearance on the cerium mantle is seen as when free air was employed—viz., a red inner zone surrounded by a bright aureole. This fact shows that the air has been able, by diffusion, to cause an upward current which escapes from the upper part of the cylinder, and to thus mix with the burnt gases which fill it. But it is evident that the volume of air which thus obtains contact with the flame is small, and that a very slight variation in the admission of air to the burner is necessary to cause the mantle to change completely either to red or white.

Distribution of Atmospheric Gases Diffused in a Vertical Current of Gas.

One of the elementary laws of diffusion is that two masses of gases tend to constantly permeate each other, whatever their nature. The case, however, of a jet of gas which is in continual contact with the atmosphere cannot be readily studied by calculation, owing to the constant changes in the position of the body; and it was therefore thought advisable to study these operations by analyzing the gas drawn from different points in the jet. Samples were taken from certain points by means of a fine tube placed in the direction of movement of the gas (the latter being ordinary coal gas in air). It was issuing from orifices varying from 12 to 20 mm. in diameter; the speed of the jet never exceeding 40 centimetres per second. The jet was protected as completely as possible from draughts.

It was found that the volume of air which diffuses is less when the gas escaping from the orifice has been previously mixed with air. The analysis of samples taken from a jet of pure gas gave the following figures :—

Consumption. Litres per Minute.	Speed. Centimetres per Second.	Per Cent.	Air. Per Cent.	Ratio: $\frac{\text{Air.}}{\text{Gas.}}$
0·496	3·95	11·4	54·9	1·22
1·350	9·9	4·4	21·5	0·28

With a previous mixture of 48·3 per cent. of air with 51·7 per cent. of gas, the other conditions remaining the same, the following results were obtained :—

Consumption. Litres per Minute.	Speed. Centimetres per Second.	Per Cent.	Air. Per Cent.	Ratio: $\frac{\text{Air.}}{\text{Gas.}}$
0·496	3·65	15·9	76·3	3·22
1·350	9·90	11·6	55·7	1·25

In the first series of experiments, and at a speed of 9·9 centimetres per second, the air displaced by diffusion 21·5 c.c. of gas. In the second series, had the volume which diffused been identical, the external air would have displaced 11·1 c.c. of gas and 10·4 c.c. of primary air. The ratio $\frac{A}{G}$ would have been equal to 1·46; but it is found to be 1·25. It is thus seen that as the gas contains a larger proportion of air the speed of diffusion decreases.

In examining the distribution which goes on at different heights of jet, samples were taken and results obtained as given in the following table :—

Constant Consumption, 0·9 *Litre per Minute.*

Height at which Samples were Taken.	Per Cent.	Air. Per Cent.	$\frac{A = \text{Air Vol.}}{G = \text{Gas Vol.}}$
5 mm.	2·3	11·5	0·13
10 ,,	5·6	28·0	0·39
15 ,,	7·6	36·3	0·57
20 ,,	9·4	44·9	0·82
25 ,,	10·3	49·4	0·98
30 ,,	11·5	55·5	1·25
40 ,,	12·7	61·2	1·58

These results, being of importance to all which follow, have been checked by two further sets of experiments; the only change being the speed of the jet :—

Constant Consumption, 1·22 *Litres per Minute.*

Height at which Samples were Taken.	Per Cent.	Air. Per Cent.	$\frac{\text{Air.}}{\text{Gas.}}$
6 mm.	2·0	9·6	0·106
10 ,,	4·2	20·0	0·250
15 ,,	6·5	31·2	0·450
20 ,,	7·9	37·9	0·610
25 ,,	8·8	42·2	0·730
30 ,,	9·6	45·9	0·850
40 ,,	11·6	53·0	1·130

Constant Consumption, 1·62 *Litres per Minute.*

6 mm.	1·7	8·2	0·09
10 ,,	3·4	16·3	0·19
15 ,,	5·2	24·8	0·33
20 ,,	6·1	29·5	0·42
25 ,,	7·2	34·6	0·53
30 ,,	8·4	40·4	0·68
40 ,,	9·5	45·6	0·84

Plotting these results, it is seen that the ratio $\frac{A}{G}$ varies for equal quantities for the equal displacements along the axis of the jet. Assuming that the speed of displacement of a unit volume remains constant (which is practically correct) at the outlet orifice, it can be said that the ratio $\frac{A}{G}$ varies with the time. In order to subject this fact to experimental test, it is sufficient to take samples of gas at one point (16 mm.) from one axis of the jet, at the same time altering the speed of the current of gas. Under these conditions, the following figures were obtained :—

Consumption. Litres per Minute.	Speed. Centimetres per Second.	Per Cent.	Air. Per Cent.	$\frac{A}{G}$
0·43	6·4	13·4	64·3	1·80
0·77	11·3	9·3	44·6	0·80
0·89	13·1	7·9	37·9	0·61
1·01	14·9	6·8	32·6	0·48
1·15	17·0	5·8	27·8	0·30
1·58	23·3	3·2	15·3	0·18
1·62	23·9	3·0	14·4	0·16
2·04	30·1	1·6	7·6	0·08

These results, when plotted, give the hyperbolic curve which, when compared with that obtained by plotting the results taken at different heights from the orifice, shows the latter to fall below the second curve. This may be explained by the fact that, in constructing the first curve, the speeds are calculated by dividing the consumption by the area of the outlet orifice; but, in consequence of friction against the sides of the tube, the actual speed of the stream of gas is greater than the mean speed. The calculated speed is thus too small; and for this reason the former curve falls below the hyperbole obtained from the latter results.

According to the foregoing calculations, the variations in the ratio $\frac{A}{G}$ along the axis of a jet of given diameter is a function of two independent variables—(1) the speed of the current of gas, (2) the distance from the outlet orifice. Considering the distance from the surface of the separation of the gases on choosing orifices of different diameters, the following results were obtained :—

Height at which Samples were taken, 16 mm.
Diameter of Jet, 18 mm.

Speed in Centimetres per Second.	Per Cent.	Air. Per Cent.	$\frac{A}{G}$
6·4	13·4	64·3	1·80
11·3	9·3	44·6	0·80
13·1	7·9	37·9	0·61
14·9	6·8	32·6	0·48
17·0	5·8	27·8	0·30
23·3	3·2	15·3	0·18
Diameter of Jet, 14 mm.			
6·4	15·7	75·8	3·13
11·3	12·8	60·9	1·56
13·1	11·5	55·3	1·24
14·9	10·4	50·0	1·00
17·0	9·3	45·0	0·82
23·3	6·8	32·9	0·49

After a mathematical consideration of diffusion effects, the author proceeds to a description of some experiments in which the mantle method was used for the investigation of flames.

(*To be continued.*)

Some New Apparatus for Controlling the Manufacture of Water Gas.

In the article with this title in last week's "Journal," it was stated (p. 833) that the water-gas plant at the Königsberg Gas-Works belonged to the Strache system. This is not the case, we now learn, as that plant belongs to the Dellwik-Fleischer system. But in the experiments described, the Strache steam-controller was applied to the Dellwik-Fleischer generators in order to conduct the manufacture of the water gas on the lines laid down by Dr. Strache. The improvement in the results consequent on the application of the steam-controller was shown in the article. It may be added that the Strache steam-controller is made by the "Prof. Strache Wassergas-und Patent-Werwertungs Gesellschaft (G.m.b.H.)," of 71, Alserstrasse, Vienna (VIII).

The current number of our contemporary the "Municipal Journal" contains an article on "The Progress of Gas Lighting," in which some of the recent achievements in the industry are surveyed in language divested of technicality. The writer deals with upright and inverted incandescent burners, automatic lighting systems, and high-pressure incandescent gas lighting—the remarkable efficiency of the last-named system being emphasized. It is altogether an appreciative article; and we agree with the author that what he has written "will serve to show that gas lighting, which began its career in Pall Mall just a hundred years ago, shows no signs of dying of senile decay."

THE ASTORIA (NEW YORK) GASHOLDER.

Capacity Fifteen Million Cubic Feet.

As long ago as the autumn of 1904, we were enabled to publish in the "JOURNAL" a series of illustrated articles descriptive of the new works which have for some time past been under construction at Astoria (New York) for the Consolidated Gas Company; and on Aug. 27 last (p. 573) we reproduced two photographs of the 15 million cubic feet gasholder. Since then the dimensions of the holder have been given in our contemporary "Progressive Age," from whose pages the following particulars have been taken.

The inside dimensions of the tank are: Diameter, 300 feet; depth, 48 ft. 3 in. The circumference is about one-sixth of a mile; and the area of the bottom is about 2 acres. The walls vary from 9 feet at the base to 5 ft. 6 in. at the top, and are strengthened by twisted square steel bars embedded in the concrete. There are none of these bars in the base; but from about 3 feet up to the top, they are laid horizontally—an extra number being put in near the top. These bars are clamped together by U-clamps, forming a joint of more than half the breaking strength of the rod itself, before being embedded in concrete. Securely anchored to this concrete wall by means of embedded bolts are the 60 tank guide-rails, and the standards of the guide-frame are attached to the tank-coping by 2½-inch anchor-bolts 20 feet in length.

The water capacity of the tank, not deducting for the cone, would be 24½ million gallons. The inlet and outlet pipes are four in number, 48 inches in diameter, and embedded in concrete. The foundation piers upon which the various gasholder sections sit when at rest, are 90 in number. The permanent frame for the supporting of the crown of the holder when at rest is made of wood, having 10 in. by 10 in. centre posts, 8 in. by 8 in. uprights, connected by rafters of 3 in. by 12 in., diagonal braces 2 in. by 10 in., and purlins 3 in. by 12 in.

The first portion of the excavation was taken out by cars loaded with a steam-shovel. In the level below, some 30 feet from the surface, the material was excavated by means of revolving cable-ways; and these cable-ways were also used for placing the concrete in position. The equipment for handling the work was laid out on such a large scale that the contractor was able to construct the entire main wall of the tank, containing 13,500 yards of concrete, in 45 working days. The tank, as completed, is practically water-tight. It was coated inside with a moderately viscous mixture of pitch and dead oil. Where cracks developed in setting, asbestos cloth, having wire network embedded, was plastered on in strips over the cracks and painted again with the liquid.

The dimensions of the five lifts of the holder are: No. 1 lift, 285 feet diameter by 46 ft. 4 in. high. No. 2, 288 feet diameter by 46 ft. 4 in. high. No. 3, 291 feet diameter by 46 ft. 4 in. high. No. 4, 294 feet diameter by 45 ft. 10 in. high. No 5, 297 feet diameter by 45 ft. 10 in. high. In the construction of the shells of the various sections, the panel system was adopted, which consists of a series of ribband plates extending from the top to the bottom of each section in an unbroken condition. To these plates are riveted the outer and inner vertical legs of the various sections. The upper ends of the ribband plates extend above the grips, and form, in connection with the auxiliary curb attached to the upper edge of the grip-sheets, a box-shaped curb capable of resisting the strains imposed upon them by the guide-rollers. This entire holder, when fully inflated, has a maximum pressure of about 14½ inches of water.

The inner section has a spherical shaped crown, 23 feet high in the centre. The shell consists of a top course of 1 inch, an adjoining course of ½ inch, a third course of ¼ inch, a bottom course of $\frac{7}{16}$ inch, a course next to the bottom of ¼ inch, and intermediate courses of No. 9 gauge steel. The shell is stiffened with 60 vertical legs, 30 placed directly opposite the standards of the guide-frame, and 30 intermediate between them. These legs are U-shaped in cross section, 16 inches deep by 8 inches wide, of No. 7 steel. The upper portion of the legs project in a radial direction, and support the cellular curb-girder which forms the top curb. These legs are riveted to the ribband plates; and they extend 10 inches below the edge of the hydraulic cup on the bottom of the section, and furnish support for the inverted cup-rollers.

The reinforcing ribband plates on the outer surface of the shell are constructed of 18 in. by ½ in. steel, extending the entire depth of the shell; and the shell-sheets are connected to the ribband plates. To meet the tremendous strains of compression in the top curb, this curb is constructed in the form of a cellular girder. Near the inside edge of the top crown-plate, next to the curved curb, is riveted an angle supporting a ⅜-inch web-girder, which meets another plate-girder projecting inward from the shell to form an interior box-girder to stiffen the curb. The curb is formed of a curved plate, which is 1½ inches in thickness. The outer course of the crown is of similar thickness. The top shell course is 1 inch in thickness, and a bottom plate ½ inch in thickness; and the inside angle is 6 in. by 6 in. by $\frac{15}{16}$ in. There are 180 web brackets of ⅜-inch steel, with a lattice bracing of 4-inch by ⅜-inch bar iron. The centre crown-plate is ⅜ inch thick; the course next to the outer is ½ inch, the third ¼ inch, and the intermediate courses are of No. 8 gauge steel. To the extended ends of the vertical legs are fastened inverted cup-rollers, constructed of cast-iron rollers with steel carriages; the rollers working against the vertical legs of the adjoining frame.

For guiding the inner section, there are 30 top-carriages, each consisting of one radial and two tangential rollers. Each of these rollers is adjustable; and the axles of all of them are located in the same horizontal plane. The carriages are constructed of steel, the rollers of cast iron, and each carriage is provided with diagonal braces to transmit the strains from the tangential rollers directly to the top curb of the inner section. To the bottom of the inner section is attached a hydraulic cup, which is 12 inches wide by 15 inches deep, constructed of a ring of 12-inch channel, 35 lbs. per foot, and a cup sheet of $\frac{7}{16}$ inch steel, which sheet is stiffened at its upper edge by two rings of 2½ in. by ¾ in. special steel bead. The crown is provided with four seal-bonnets, one over each inlet and outlet pipe. Each bonnet is supplied with a dip-sheet, which forms the seal for the pipe when the crown is resting upon the landing piers. This permits the sealing off of the gas in the crown of the holder, and the opening of the manholes over the top of the pipes in the top of the bonnets.

The second, third, and fourth sections are of similar construction, with a hydraulic grip on the top edge of the section and the cup of the lower edge. The cups are of the same dimensions as that described for the inner section; and the grips are of the same dimensions as the cups—being inverted. The thickness of the plating in these sections varies but little; being ⅜ inch for the top and bottom courses, $\frac{5}{16}$ inch for the adjoining courses, and No. 10 gauge steel for the intermediate courses. The legs, 60 in number for each section, are constructed of a ribband plate, which forms part of the leg, 17½ in. by ½ in., flanged channel-shaped inner stiffeners ¼ inch in thickness, and a trough-shaped outer stiffener of ⅜-inch steel. The ribband plates, all forming a portion of these stiffeners, extend on top to form a box-girder, as already described. The lower end of the inner stiffener extends below the cup for supporting the inverted cup-rollers.

The inner sheets of the hydraulic grips are extended from 18 to 22 inches above the grip-channel, and support a specially constructed platform consisting of channels, angles, bars, and steel checkered floor-plates, which are conveniently located to the guide-frame stairs and ladder to permit of easy access to the grips of the various sections. Each grip platform is protected with a gallery of malleable iron posts and three lines of 1-inch diameter tubing; and the same protection is furnished to the crown of the holder. Each section is provided with 30 top-carriages having one radial and two tangential rollers, as described for the inner section. To the bottom of each section, fastened to the extension of the inner legs, there are 60 inverted cup-rollers, as described for the inner section.

The outer section was constructed the same as the second, third, and fourth sections, with the exception that the lower edge of this section is strengthened with a curb consisting of two 8 in. by 6 in. by ¾ in. steel angles. To this curb are attached 60 tank rollers, working against the guide-rails in the tank. These rollers consist of one radial and two tangential rollers.

It is quite evident, says "Progressive Age," that the holder shells, when inflated with gas, will float with stability for a certain distance without danger of tilting, if no outer force is brought to bear against them. Guides, however, become necessary to keep the holder upright when the shells rise and pass from an uneven state of stability into an unstable condition. In making the statical computations for both the holder and the guide-framing, the wind is assumed to be moving at the rate of 100 miles per hour; and it is also assumed that a maximum snow-load of 5 lbs. per square foot may be distributed over one-half the entire crown. Since the holder is supplied with both radial and tangential rollers, the wind pressure is distributed over three-quarters of the entire guide-framing, no matter what the direction of the wind—the guide-framing at the same time being so proportioned that no part of it will be subject to a strain exceeding 12,000 lbs. per square inch of net cross section. The guide-framing consists of 30 plate standards, forming, together with the girders, diagonals, and horizontal tie, 30 panels of seven bays each. The standard measures at its base, 4 ft. 6 in., tapering to 2 ft. 6 in. at the top, and having a total height of 238 ft. 9 in. The standard is connected at its base to a heavy casting, which, in turn, is secured to the tank wall by means of four 2½-inch bolts, as described above.

The standard guides of the holder are made of 12-inch steel beam; the radial rollers working against the web in which the rivets are countersunk, and the tangential rollers against the flanges. For the strains in the different sections of the standard girders and diagonal braces, liberal allowance was made. The upper girders which complete the guide-framing are made very heavy, to give rigidity to the frame, tending, in connection with the wind ties, to resist any horizontal distortion; and the bases securely anchored to the tank wall guarantee this result. Each standard was stiffened by means of a 6 in. by 6 in. by ½ in. angle-brace, which connects the top curb of the girder to the extremity of the standard with a ½-inch web-plate, which is, in turn, supported on its outside by means of a heavy steel bracket. The horizontal ties are made of angle-guards, bound together with ⅜-inch bars, and securely riveted to the web of the standard. The lines of forces of the girders, diagonals, and standards are made to meet at a common point, and are so arranged that the strains in them are carried to the standard bases, by which they are transmitted to the foundation bolts of the tank-coping. The girders,

by means of lateral braces made of steel angles, are further stiffened so as to transmit the strains to both front and back chords simultaneously. In two of the guide-frame bays, steel stairways are located, which extend from the tank-coping to the top girder; being arranged in flights from bay to bay, with a suitable landing platform. From these platforms the ladders already referred to can be easily reached.

The holder was constructed by Messrs. Bartlett, Hayward, and Co., of Baltimore.

TAR FOR ROAD SURFACES.

In an article published in the "Contract Journal," on the subject of the prevention of road dust, Mr. B. H. Thwaite draws attention to the suitability of tar for this purpose.

He says it is a remarkable coincidence that a bye-product is available at all our gas-works, bye-product coke-ovens, and bituminous coal-fed blast-furnaces, which, if applied rationally and scientifically, permits the road surfaces to be carpeted in such a way as to secure all the necessary qualifications. Nevertheless, the enormous extent of our roads and highways (estimated at 27,000 miles) requiring anti-dust surface treatment, will involve a considerable annual consumption of tar; so that it is obvious, if the supply is to be secured at a reasonable cost, the greatest economy should be observed in applying this really valuable bye-product of gas manufacture and coke production. Tar applied cold (or only warmed) and holding water, during the first heavy rain becomes a vile kind of tar-mud, which, scattered on to the clothes of pedestrians, is objectionable to a degree. There is only one correct way in which tar can be applied, to secure in full measure all its valuable qualifications as a hygienic road-dust preventer, and that is to, as far as practicable, utilize the secret of the wonderful success of Dr. Angus Smith's application of tar to water-service mains. This means, first, the dehydration and the raising of the temperature of the tar to 300° Fahr. immediately before application on the road surface; secondly, the dehydration or removal of the water from the surface of the road by heating immediately prior to the spreading application of the heated tar; and thirdly, if sand is thrown on to the tarred surface it should be preliminarily heated to (say) 400° Fahr. before it is spread. These conditions are the canons of completely successful tar application to road surfaces; and it is only by this treatment that the soaking of the tar into the joints is possible, because if there is moisture present its evaporation alone will tend to prevent the introduction and penetration of the tar. The hot tar should not be applied too thick—firstly, for reasons of expense; and, secondly, because the covering of tar will be more liable to be broken up by vehicular and horseshoe effects than if the covering consisted of a highly tenacious hydrocarbonaceous skin, which provides little (if any) degree of breaking-up facilities for the horseshoe, or the studs or rivets of motor tyres, or the barred wheels of traction engines.

Mr. Henry Rowe, the Vice-Chairman of the Worcester New Gaslight Company, left £23,293.

At the meeting of the Society of Engineers next Monday, special reference will be made by the Chairman to the decease of the late Secretary (Mr. Perry F. Nursey), who, as many of our readers are aware, had been connected with the Society practically from its commencement, and had contributed largely to its transactions.

A presentation was made last Friday by the members of the Oldham Gas Students' Association of a number of technical and other books to Mr. Fred Chadderton, one of their number, who has been appointed Assistant Gas Manager at Barrow-in-Furness. Mr. Chadderton, who has also been presented with a token of goodwill by the workmen, stokers, fitters, and other employees at the Oldham Gas-Works, has been the Works Manager at the central Corporation gas-works for eighteen months, prior to which he was Chemist at the station for three-and-a-half years, after having had other experience in the department.

Standards for lightning protection for chimneys have been adopted by the United States Navy Department shipyards; the proposed means being varied for different heights of chimneys, to cover those found in the different yards. It is specified that the conductors shall each be made up of seven No. 10 copper wires, two in number for chimneys up to 50 feet in height, three for those between 50 and 100 feet, and four for those higher than this—in all cases being symmetrically disposed around the stack, and forming a cage enclosure. They are to be fastened firmly (without insulators) to the outside chimney surfaces by bronze anchors; the latter being spaced 10 feet apart, and soldered to the conductors at 50 feet intervals. At the bottom of the stack, the conductors connect with 3 ft. by 3 ft. by $\frac{1}{8}$ in. copper earth-plates, buried in the ground below the water-line, and at the top to a $1\frac{1}{2}$ inch square copper ring, to which the discharge tip-rods are attached. The latter are of $\frac{3}{4}$-inch solid copper, 10 feet in length, spaced 4 feet apart around the circumference of the chimney cap; each terminating in a two-pointed aigrette. The portions of the conductors near the chimney base are to be protected by a $1\frac{1}{4}$-inch galvanized iron pipe sheathing, rising 10 feet above the ground level, and extending 3 feet below it.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Gas-Heating Business Field.

SIR,—However satisfactory a gas-heater may be hygienically and in point of cost, it must also be such as will harmonize in design with the general plans of an architect. Is it not singular that, though there are National Associations representing gas engineers, gas industries, and architects, nothing has yet been done towards a joint consideration of the subject? There is a good deal of sound common sense in the letter which appeared in your last issue from J. Stead Hedley, the moral of which is that the voice of the architect cannot be ignored. It is "pot luck" now if the stove-makers bring out a design of gas-fire that is fortunate enough to win here and there an occasional nod of approval from architects.

Mr. Harman alludes to the "miserable little register fire," while Mr. Hedley pleads for an "up-to-date register gas-grate." Though not the most economical, a register fire is undoubtedly the best hygienically; and future success may be chiefly looked to from a gas-fire combined with a satisfactory register. This will probably be achieved by making the body of "fuel" narrower, and improving its quality. The remark made by Professor Lewes in his Dublin lecture, that radiation could be increased one-third by a modification of the "fuel" constituents, has not received the prominence that it deserved.

There has been a considerable booming of differential prices. Herein does not lie the panacea for all the non-success of gas heating. Still it has its influence; and an exhaustive inquiry into the practical effect of differential prices might well be undertaken by the Institution of Gas Engineers. It would at least serve to show how far an extension of gas-heating may be looked for in this direction. The evidence will have to be very clear before most engineers make such a difference as that made by the Huddersfield Corporation, and which confessedly has not advanced gas heating very much. There does not seem to be much logic in supplying a gas-fire user, who comes on (say) in September and goes off in April, with gas at a cheaper rate than the lighting user who is a twelve months' customer. Where heating is supplied at a less rate, there is the anomaly of electric-light users obtaining gas at a less average rate than those users of gas who take a lighting as well as a heating supply. Under these conditions, the user of gas for lighting is indirectly subsidizing the electric-light user.

That, of course, is only the conviction of the writer; but for his, as well as the guidance of the whole profession, the present may well be considered an opportune time to appoint a Commission to examine the subject thoroughly.

Sept. 28, 1907. RADIATION.

The De Brouwer and the Ludbrook-Cole Machines.

SIR,—In your issue of Sept. 10, I notice, under the heading "Register of Patents," a description of a recent patent taken out by Messrs. Ludbrook and Cole for a retort discharger, in which the pusher-rod or bar is constructed of a number of sections hinged together so that they may be wrapped round a drum or coiled in the apparatus carrying same, to economize space.

If the patentees would only look at the drawings, and read the specification, of my patent No. 14,089 of June 24, 1903, they would see that their patent is completely lacking in novelty—both the drawings and the method of working their patent are identical with mine.

When Mr. Ludbrook took out his patent No. 14,980 of 1905—for a discharging machine, having the discharger made of two rigid bars, one of which was guided upwards at the back end—I formed a good opinion of his machine, and hoped it would meet with success. Now that I see from the recent patent that Mr. Ludbrook has had occasion to lower his tail, I cannot help but feel that something has been amiss with the idea.

'Tis the lot of the inventor, alas! often to start with his tail in the air, only to return speedily with it between his legs. But cannot Mr. Ludbrook find other grounds than my invention on which to exert his wits? Patents, of course, can be improved upon; and for my part I welcome improvements from whatever side they may come. But infringements should be avoided.

Bruges, Sept. 26, 1907. J. DE BROUWER.

Gas-Fires.

SIR,—With regard to the correspondence presently going on in your columns on the subject of gas-fires, I observe with some regret that the makers seem to be tumbling over each other in their eagerness to supply a 10-inch fire with a consumpt of 15 feet. To my mind, it is impossible to make a satisfactory gas-fire of this size at such a consumpt. I am speaking from some experience when I say so.

Last year I obtained one of these much-boasted economical fires, and gave it an exhaustive test. The result was far from satisfactory, and confirmed me in the opinion which I held and still hold—viz., that 15 feet will not make a gas-fire. There are good reasons to be advanced in favour of the shallow fire; but why need a shallow fire be also a low-consumpt fire? To my mind the result of this wholesale cutting-down of consumpts will be that the public will become disgusted with fires which would make one cold to look at.

I may say that the fire referred to above was burned for a very considerable time, and that the varnish is not yet all off the front bars—proof positive that the fuel has not become red to the top. If the gas-fire is ever to gain the position the gas-cooker has done, it will not be by lowering its efficiency. There is great room for improvement in gas-fires, but the low-consumpt fire is not an improvement. Rather is it a backward step; and I am convinced that a few years will see the end of it.

I should be glad to hear the views of some of the leading makers on this point.

Sept. 27, 1907. D. S.

REGISTER OF PATENTS.

Bunsen Burners for Illuminating and Heating.

WOUWERMANS, P. VON, and the GASSPAR-UNTERNEHMUNG NACH SYSTEM WOUWERMANS, HALBMAYR AND COMPANY, of Vienna.

No. 21,158; Sept. 24, 1906.

This invention relates more particularly to the heating of the gas and air mixture to a high degree by means of heat taken from the upper part or head of the bunsen burner, for the purpose of increasing the efficiency of the burner.

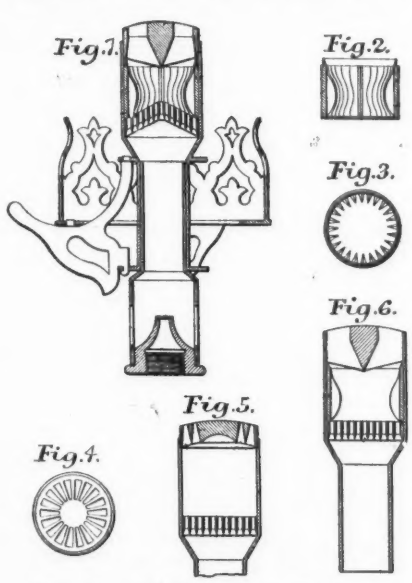
The cap or head-piece of the burner is made of good heat conducting metal (such as copper), and is provided with nozzle-shaped outlet openings gradually decreasing in cross section towards the outlet; while the walls separating the openings are made comparatively thick and with bevelled or knife edges at the ends facing the current of gaseous mixture. The outflow velocity of the gas mixture is thus increased, and friction and checks to the gas and air mixture when entering the openings are prevented—the knife-like lower edges cutting smoothly through the current. The flashing-back of the flame is said to be so effectively prevented that the mixture may be heated to a very high degree.

In conjunction with the cap a heater is provided at the upper part of the mixing-tube, which is made of metal of less heat-conductivity than the cap (such as iron). The heater—made of copper or other metal or alloy of good heat conductivity—consists of a tubular piece closely fitting in the mixing-tube and provided on its inner surface with a number of flat ribs or fold-like projections, preferably of segmental shape, the cross section of which gradually decreases from both sides so as to form a sharp edge.

For attaining the highest efficiency, it is said to be advisable to arrange the known distributing and mixing grating, composed of vertical channels, below the heater; the walls of the grating forming the channels being bevelled at their lower ends so as to form cutting edges for the purpose of preventing any checks in the flow of the mixture, and decreasing the inlet friction.

The result claimed from these means and their combination is that "by the co-operation of the continued and increasing heating of the gas and air mixture in the upper part of the burner, with the prevention of checks at the inlet into the channels of the distributing grating and at the inlet into the openings of the cap, and with the nozzle-like shape of the outlet openings of the cap, the gas and air mixture flows out in a highly heated condition with very great velocity."

The distributing and mixing grating may be of disc form, plane, or sloping, or may be made in the form of a double sloping roof or of shallow cone shape. The cross sections of its channels may be of equal width or may increase in width outwardly. The openings of the cap of the burner, which may consist of a perforated disc or a core provided with radial ribs, may be formed circular or slot shaped—preferably their width increasing in a direction from the centre outward.



Wouwermans' Lighting and Heating Burner.

Fig. 1 is a vertical section through a burner provided with a slotted head-piece and a heater having ribs of segmental shape. Fig. 2 is a sectional elevation of the heater. Fig. 3 is a plan of same. Fig. 4 is a top plan of the slotted head-piece. Fig. 5 is a vertical section through a burner with a perforated head-piece. Fig. 6 is a vertical section of a burner with a modified slotted head-piece.

In fig. 1, the expanded burner-head has in the bottom a cone-shaped distributing and mixing grating, the cross sections of the channels of which are circular. The walls of the channels are bevelled to form cutting edges at the lower ends, so that they sharply cut the mixture; and the latter enters the channels without any check. Above the grating is arranged a heater, consisting of a tubular body provided with radially projecting ribs on its inner surface, made in the shape of segments of a circle. The cross section of the ribs preferably decreases from both sides inward, so as to form a cutting edge. The heater reaches up to the head-piece, which is in the form of a comparatively thick disc perforated with slot-shaped openings arranged radially around a solid middle part, and increasing in width outwardly or towards the circumference. The slots broaden out downwardly; their partitions having a V-shaped cross section, so that their lower ends form cutting edges, whereby the mixture is enabled to enter the slots without any check.

In the burner shown in fig. 5, with the heater omitted, a disc-like shallow distributing grating is employed, and the head-piece is provided with holes of circular cross section expanding downwards and arranged, for example, in two concentric rows around a solid middle part; the holes of the outer row being larger than those of the inner row.

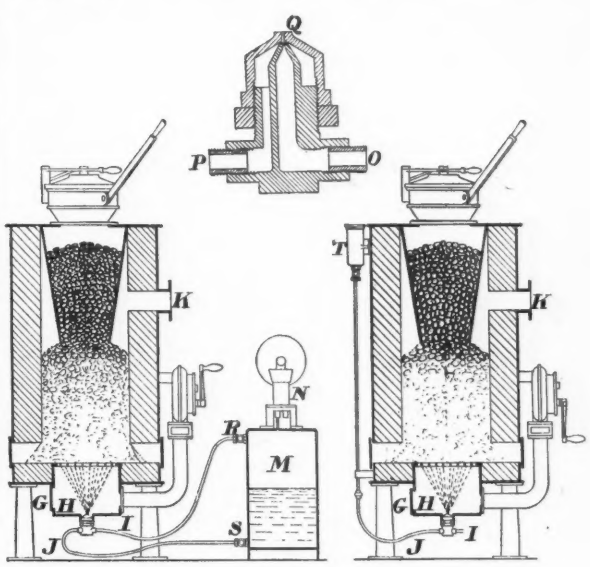
In the burner shown in fig. 6, the head-piece is constructed as a core, provided with radial ribs, which increase in breadth outwardly, and at a short distance from the upper edge are bevelled from both sides so that their lower ends form cutting edges.

Manufacture of Producer Gas.

DOWSON, J. EMERSON, of Victoria Street, S.W.

No. 21,258; Sept. 25, 1906.

The type of generator here used is that in which steam and air are employed to make combustible gas suitable for heating purposes or for working engines. The generator can be of the suction or pressure type—that is to say, it can be worked by the suction of an engine or fan or, with suitable modifications, it can be worked with air forced into it by a blower, pump, injector, or other suitable means—or it can be worked partly by air drawn in by suction and partly by air forced in by pressure.



Dowson's Gas-Producer.

The illustrations show a central vertical section of a generator and of a convenient form of receiver to contain water and air at pressure; also a central vertical section of a generator supplied with air and water at pressure without the receiver, and an enlarged view of a convenient arrangement for mixing air and water previously to the latter being atomized, as well as for atomizing the water.

When the first arrangement is used, the pump N is made to force air at pressure into the receiver M. The cocks R and S are then opened and regulated to admit the required quantity of air and water to the atomizer H. The air and water mix near the nozzle of the atomizer, and the mixture of atomized water and air which leaves the orifice Q is then forced into the fire through the grate. A further supply of air may be forced in by the pump N or other convenient means; but if the plant is worked by suction in conjunction with an engine, the latter should draw in an additional supply of air through the opening G. In this way "a useful combustible gas is formed" and leaves the generator at K.

When the second arrangement is used, the receiver M is dispensed with; and air at pressure from any convenient source enters the atomizer at I. At the same time water from the feed pot T enters at J. The process is then similar to that already described. Instead of air at pressure, some of the burnt gases can be taken from the cylinder or exhaust of an engine while they are at pressure, and they can be passed into the atomizer at I. It is better, says the patentee, to have a head of water as described; but by means of the atomizing apparatus shown, it is also possible to work with water drawn from a tank or vessel placed below the level of the apparatus.

It is essential for the process that the water should be atomized, as mere jets of water will not give a satisfactory result, and that a small proportion of air should be mixed with the water as it is atomized so as to assist the atomized water being held in suspension and to prevent its rapid condensation. Or some burnt gases from an engine may be mixed with the water as it is atomized.

Gas Burners and Fittings.

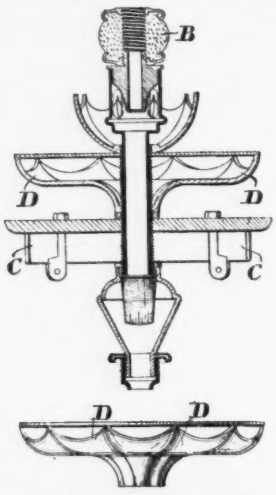
WINN, P., of Birmingham, and WILKES, A. H., of Four Oaks.

No. 26,064; Nov. 17, 1906.

This invention has for its object to increase the efficiency and to prolong the life of gas burners and fittings by the provision of means for ensuring the better protection of the parts from heat.

The burner-tube is arranged with the usual mixing-chamber, into which the air is drawn through a series of holes in the top—the amount

of air being regulated by a surrounding perforated ring. The gas-conveying tube leading into the mixing-chamber is carried by a plug in the top of the chamber, but projects slightly above this into a wood insulating union B, by which connection with the down tube is made.



Winn and Wilkes' Inverted Gas-Burner.

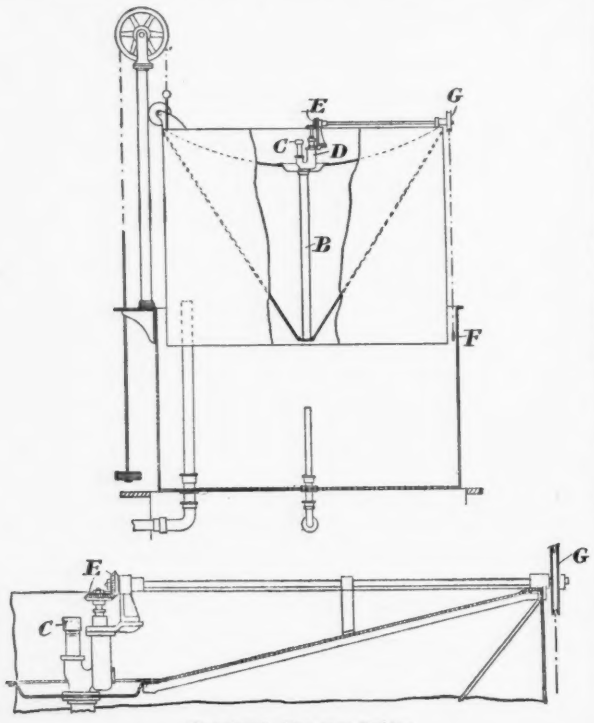
The lower end of the gas-conveying tube projects into the mixing-chamber a short distance below the air inlets. At the lower end of the burner-tube is arranged a second mixing-chamber, in which gauze strainers are carried. The lower mixing-chamber is directly over where the mantle is supported. The means for deflecting the hot gases clear of the fitting are on the burner-tube between the upper and the lower mixing-chambers. They consist, first, in a hollow or other ring C, and secondly in a deflecting cone D. The ring may be of any suitable material (preferably of china or porcelain) supported on the metal ring carrying the globe. This ring is perforated with two or more fairly large perforations, and is provided on the top with a disc of porcelain or other suitable material. Generally these heat obstructors have comprised domes or the like with perforations in the lower edges. Above the covered ring is the second deflector, consisting of the fluted inverted cone D with a mica disc on top. The hollow cone is specially shaped so that the flutings form points for supporting the mica disc, leaving gaps or outlets for hot gases between each point. To form a connection between the down tube and the burner-tube there is the insulating union B, which keeps the down tube cool and prevents the metal-to-metal contact hitherto usual. The insulating piece B has its ends capped with metal having turned-in flanges. The caps are kept completely insulated by the wood or some equivalent body; and "they enable the union taking a thread better for connecting to the other parts."

Gasholders.

MANSFIELD, A., of Liverpool.

No. 28,387; Dec. 12, 1906.

This is an arrangement of gasholder whereby the gas can be produced at low pressure—say, 3-10ths—and passed out for consumption at (say) 80-10ths. It "also provides against accidents—such as great heat expanding the gas, coupled with strong winds causing the gas to bubble out under one side at the imminent danger of overturning the holder."



Mansfield's Pressure Holder.

The holder is hollow or cup-shaped at the top, so that it can contain water. A conduit or pipe B, from the bottom of the hollow, passes right through, but is sometimes stopped off short some distance from the bottom, for a reason hereafter explained. C is a telescopic or fixed curb, preferably screwed on the pipe so that the water the moment it rises above the curb flows over the curb and into the holder tank or overflow. Thus "the hollow is never allowed to be full, and yet it can be so deep that the wind can have little or no effect in splashing out the water." D is a valve placed in a little depression—preferably in the centre of the cup-shaped top, so that it can be screwed down on to its seat—and connected by bevel-gearing E with a handle F having a chain over a pulley G in any convenient position. This valve is to close the flow into the vertical pipe or regulate it as required. The curb can be either fixed when it is always required for the gas to be delivered at a given pressure or telescopic so as to be raised or lowered, and thus give any pressure desired.

The mode of operation is as follows: The gas from the gas-works passes into the holder at the ordinary pressure of manufacture; and the cup-shaped top of the holder being empty, the holder rises to the maximum height allowed, when the gas is shut off. Water is now pumped from the tank (or brought from any source if the tank happened to be too low) up into the cup-shaped top until it begins to overflow at the curb. The pumping is then stopped. The holder is now ready for delivering the gas at high pressure, according to the weight of water in the holder. When the holder is nearly empty, and it is desired to refill it with gas at the minimum pressure, the valve is opened, and the water falls down the central tube into the tank; and being in depression of the cup or dish-shaped hollow, it draws out all the water from the hollow. Before the holder is again drawn from, the valve is closed and the hollow again filled to the level of the curb by pumping it from the tank. Should a heavy rain come down, the hollow cannot be filled by the rain above the desired maximum, as the water overflows the curb and thus at once descends into the tank.

APPLICATIONS FOR LETTERS PATENT.

20,531.—FRAZER, D., "Gas-fires." Sept. 16.
20,543.—GADD, W., "Spirally-guided gasholders." Sept. 16.
20,556.—KAY, C. W., "Meters for liquids." Sept. 16.
20,595.—SCHULZE, W., "Safety-valves for gas-conduits." Sept. 16.
20,638.—HALSTED, W. A., "Prepayment system for gas." Sept. 17.
20,656.—WILLIAMS, A. A. V., "Enabling taps or cocks to be disconnected from supply-pipes." Sept. 17.
20,680.—KILNER, T., "Cocks of self-lighting and other gas-burners." Sept. 17.
20,685.—VIGNON, L., "Manufacture of gas." Sept. 17.
20,738.—GRANT, C., "Generating power by means of steam and gas produced by internal combustion." Sept. 18.
20,777.—DRAGER, J. H. & A. B., "Burners for welding." Sept. 18.
20,858.—STANTON, F., "Atmospheric burners." Sept. 19.
20,886.—GRIMWADE, L. L., and ROBERTS, J. G., "Gas-fired kilns." Sept. 20.
20,933.—ASSERSOHN, D., "Gas illuminated 'flash' advertisements." Sept. 20.
20,954.—KENNEDY, R., "Two-stroke gas-engines." Sept. 21.
20,955.—KENNEDY, R., "Converting ammonia sulphite solution into ammonia sulphate solution and free sulphur." Sept. 21.
20,957.—KENNEDY, R., "Bituminous coal-gas producers." Sept. 21.
20,964.—GRIMWADE, L. L., and BROOKFIELD, E., "Gas-fired kilns." Sept. 21.
21,025.—RYLAND, T. J. F., "Rotary gas-engine." Sept. 21.

Leeds Corporation Labourers' Wages.—At a recent meeting of the Gas Committee of the Leeds Corporation, an application was received from the labourers in the meter department for an advance of 1s. per week—viz., from 24s. to 25s. On the motion of the Chairman (Mr. Ratcliffe), it was resolved to recommend the Consultative Committee to grant the advance. About forty labourers will be affected. The salaries of four divisional inspectors in the meter department were also increased by 2s. per week each.

Leeds Gas-Coal Contracts.—According to a local paper, the Gas Committee of the Leeds Corporation, who refused to buy, owing to the high rates recently prevailing, have just concluded contracts for 180,000 tons of coal, which, with the supplies already in hand, will last them till June next. Of the new contracts, 100,000 tons were at an average advance of 1s. 6d. per ton on last year's rates; but the price for the balance was higher—the total average advance being 2s. 1½d. per ton. This is considerably less than was demanded some months ago.

Electricity Deficit at Keighley.—At last Tuesday's meeting of the Keighley Town Council, Alderman Paget made a statement as to the Electricity Department for the year ended the 30th of June. He confessed that the works had never been entirely satisfactory. There had been an augmentation of capital without a corresponding increase in the return. During the past year there had been an additional outlay of £1217; making the total to date £57,409. The repayments by sinking fund and the amount in hand represented £7012. The estimated expenditure had been exceeded by only £45; but the income for current, &c., had been less by £675. Adding to this a deficiency on the previous year of £253 more than was foreseen, the position was that there was a deficit of £973. Looking to the future, the prospects for power purposes were distinctly encouraging, and there was some ground for hoping that it was only a question of time, patience, and labour for the electricity concern to become a paying one. Mr. N. King criticized in detail the expenditure of the department, and said that in two or three particulars the charges had exceeded the estimates. Mr. J. W. Midgley expressed regret that the selling price of current had been reduced below the paying point. Eventually the accounts were passed.

MISCELLANEOUS NEWS.

BRITISH GASLIGHT COMPANY.

Increase of Business at the Large Stations—The Company's Yarmouth Tar-Distillery—The Carry-Forward and the Price of Coal.

The Half-Yearly General Meeting of this Company was held last Wednesday, at the London Offices, No. 11, George Yard, E.C.—Mr. J. HORSLEY PALMER in the chair.

The SECRETARY (Mr. H. B. Chamberlain) read the notice calling the meeting; and subsequently the report of the Directors and the accounts (in compliance with the Act of Parliament) of the Norwich station. The Directors' report was as follows:—

The Directors submit the half-yearly accounts of the Company to June 30 last, as examined and certified by the Auditors, who have also vouched for the correctness of the several investments held by the Company.

The available profit is £29,440, after deducting the following sums (omitting shillings and pence): Income-tax, £1530; Hull debenture interest, £2137; Norwich debenture interest, £1130; Potteries debenture interest, £665; Trowbridge debenture interest, £166; interest on debenture stock, £2280—total, £7909.

HULL.—The gas-rental shows an increase of £3030, as compared with that of the corresponding period of 1906; the price of gas having been the same—viz., 2s. per 1000 cubic feet. Coke shows a decrease of £334; tar and tar distilling, of £366; and ammoniacal liquor and sulphate of ammonia, of £610. Coals have cost 12s. 6d. per ton, as against 12s. 1d. Coke has realized 10s. 11d. per ton, as against 10s. 5d. The gas sent out was 622,845,000 cubic feet, against 585,928,000 cubic feet in the corresponding period of 1906—an increase of 36,917,000 cubic feet, or equal to 6·30 per cent. Of this quantity, 46,704,000 cubic feet was supplied in bulk to the Corporation for the supply of the Old Town, The profit realized is £1723 in excess of the parliamentary interest. This sum has been invested, making the reserve fund £30,237.

NORWICH.—The gas-rental shows an increase of £2156, as compared with that of the corresponding period of 1906; the price of gas having been the same—viz., 3s. 3d. per 1000 cubic feet. Coke shows an increase of £1167; and tar and ammoniacal liquor, of £369. Coals have cost 16s. 5d. per ton, against 15s. 8d. Coke has realized 16s. per ton, against 14s. 7d. The gas sent out was 256,336,000 cubic feet, as against 237,142,000 cubic feet—an increase of 19,194,000 cubic feet, or equal to 8·09 per cent. The profit realized, after writing off £4000 on account of reconstruction of works, is £290 in excess of the parliamentary interest.

POTTERIES.—The gas-rental shows an increase of £168, as compared with that of the corresponding period of 1906; the price of gas having been the same—viz., 2s. 6d. per 1000 cubic feet. Coke shows an increase of £473; tar, of £20; and ammoniacal liquor and sulphate of ammonia, of £19. Coals have cost 10s. 7d. per ton, against 10s. 4d. Coke has realized 7s. 9d., against 6s. 7d. per ton. The gas sent out was 197,963,000 cubic feet, against 191,732,000 cubic feet—an increase of 6,231,000 cubic feet, or equal to 3·25 per cent. The profit realized, after writing off £4000 on account of buildings and plant thrown out of use, is £1713 less than the parliamentary interest. This sum has been taken from the reserve fund, leaving a balance of £7299 to the credit of that account.

TROWBRIDGE.—The gas-rental shows a decrease of £312, as compared with that of the corresponding period of 1906, the price of gas having been the same—viz., 3s. per 1000 cubic feet, with discounts. The residual products show an increase of £18. Coals have cost 14s. 11d. per ton, against 15s. Coke realized 10s. 1d., against 9s. 5d. per ton. The gas sent out was 35,278,400 cubic feet, against 36,339,500 cubic feet—a decrease of 1,061,100 cubic feet, or equal to 2·91 per cent. The profit realized, after writing off £234 on account of reconstruction of retort-bench, is £680 17s. 11d. less than the parliamentary interest.

HOLYWELL.—The gas-rental shows an increase of £39; and residual products, of £13. The profit realized is £425.

The available profit, added to the previous balance of profit and loss, amounts to £69,769. From this the Directors recommend a dividend at the rate of 10 per cent. per annum, free of income-tax. This will amount to £24,500, and leave a balance of £45,269.

The Directors who go out of office are Mr. Corbet Woodall and Mr. Robert S. Gardiner; and the Auditors are Mr. Edward Yardley and Mr. E. Knowles Corrie. They respectively offer themselves for re-election.

The CHAIRMAN said it was his duty to move the adoption of the report and accounts. In making a few remarks regarding the half-year's working, he thought they could first congratulate themselves, both as Directors and as shareholders, upon the favourable situation in which they found themselves at the present time. Concerning the accounts, it was one of the features of gas undertakings that they showed, as a rule, a very steady and progressive rate of increase. The gas industry now provided one of those investments which commended themselves very much to the British public, because investors felt sure of a steady rate of dividend, and not a fluctuating one, as was the case in many other industrial concerns—at one period paying enormous rates of interest, and at another period paying hardly anything at all. It was satisfactory to know they had, at their three largest stations, a steady increase of business. At Hull, as the report stated, the increase in the consumption of gas had been 6¼ per cent.; at Norwich, no less than 8 per cent.; at the Potteries (where the general commercial business had not been good over a long series of years), there had been an increase of 3¼ per cent. These figures compared very favourably with the results of the Company's operations a year ago. He wished, on this occasion, to make a few remarks on the Norwich station, because, in the accounts presented that day, it was seen that for the first time for thirteen years they had exceeded what was called the "parliamentary interest"—that was to say, the interest allowed by Parliament on the capital expended at the station. To obtain this result, they had had, as he had frequently observed at these meetings, to incur a large expenditure in the reconstruction of the very old works, which were in rather a difficult situation. But the policy of the Directors had borne fruit for the shareholders, as was shown by the present accounts; for, in addition to writing off £4000 from revenue on construction account, there had been earned a small amount above the parliamentary interest. This went into their pockets, because they did not have to place the surplus to a reserve fund until the arrears of interest which were due from the Norwich station had been recouped. One interesting feature with regard to the same station had reference to the re-opening of their tar-distillery at Yarmouth. This tar-distillery was the parent Company's speculation—that was to say, the honour (if they liked to put it so) did not belong to the Norwich station, but it was built for the purpose of assisting the Norwich station in disposing of their tar. Six months ago he stated that the Board had determined to re-start the tar-distillery, because of the almost impossible price they were offered by the distillers for their tar. This step had resulted in satisfactory business. The Board had had a few figures taken out giving the results of the price of tar at the Norwich station since 1903; and the effect of them was that the Company formerly netted only ½d. per gallon, against the 1d. a gallon they, as tar distillers, were able to pay the Norwich station for its tar. In addition to this, the Company made a small profit for themselves. He did not say it was a very large profit, but it was an appreciable profit. From this sum, the Directors were able to give the Manager of the Norwich station some recognition of his services as tar distiller at Yarmouth, apart from his services as Engineer and Manager at Norwich. He (the Chairman) hoped this tar-distilling business would go on in the same satisfactory manner as it had been proceeding during the last ten months. He might add that the Norwich Auditor expressed himself as exceedingly satisfied with the liberal way in which the Directors had treated the Norwich station in respect of this item of tar. The shareholders would have noticed that a considerable sum of money was being carried forward to the next accounts. They would all be aware that it was very necessary at the present time for gas companies to strengthen their position. Up to within six months ago, they had been able to obtain at a fair price their chief article—the one they used almost entirely in their manufacture—coal; but now they were face to face with the position of having to pay 2s. 6d. to 3s. per ton more than in the immediate past; and, therefore, it was absolutely necessary for them to carry forward a considerable sum, until it was seen how they would stand during the next twelve months. The sum that was being carried forward was £45,269; and this he did not think was an unreasonable amount, when they considered the largeness of their operations at Hull, at Norwich, and in the Potteries, and the fact that a great deal of this money was used as working capital. The Directors had been for years hampered through not having really sufficient working capital for the large operations that they had to conduct at the Company's different stations. The considerable amount of money referred to was therefore, practically speaking, invested in the Company's business as working capital; and it would probably be necessary to draw upon it during the next twelve months to meet the increased expenses for coal. He did not wish to detain the shareholders any longer; seeing there was nothing to remark upon in connection with the general business, otherwise than that it was going on satisfactorily. There had been a steady increase in meters, in new services, and, particularly, in the fitting up of new houses at every station; and so the Company's business was going on thoroughly well.

Mr. FREDERICK WILKIN seconded the motion, which was unanimously carried.

On the proposition of the CHAIRMAN, seconded by Mr. R. S. GARDINER, a dividend of 20s. per share (free of income-tax), for the half year, was declared.

The CHAIRMAN moved the re-election to the Board of Mr. Corbet Woodall. He remarked that Mr. Woodall's absence was due to his being unavoidably detained on the Continent. They all knew the valuable services Mr. Woodall rendered to the Company. He was always ready to run down to their stations, and give their Engineers advice whenever they required it.

Mr. FREDERICK WILKIN seconded the motion; and it was cordially agreed to.

Moved by the CHAIRMAN, and seconded by Major-General CORRIE, Mr. R. S. Gardiner was also returned to his seat at the Board.

The Auditors (Messrs. E. Yardley and E. Knowles Corrie) were re-appointed, respectively on the motion of Mr. GRAHAM WILKIN, seconded by Mr. ABBEY-WILLIAMS, and on the motion of Mr. BERNARD F. HARRIS, seconded by Mr. A. G. BURNEY.

Mr. BURNEY then moved a vote of thanks to the Chairman and Directors. He observed that to their able management was largely due the satisfactory position which the securities of the Company occupied at the present time on the Stock Exchange—a matter which was the cause of great satisfaction to all the shareholders, especially when they regarded the record that so many old securities had presented of late.

Mr. ABBEY-WILLIAMS seconded the motion; and it was heartily adopted.

The CHAIRMAN, in responding on behalf of himself and colleagues, said he was afraid he did not consider that Stock Exchange prices of securities were worth very much. The Directors did not look so much to the price of the securities as to the results of the working of the Company's business, in their endeavour to earn a proper and sufficient dividend for the shareholders.

Mr. R. S. GARDINER proposed a vote of thanks to their Secretary (Mr. Chamberlain) and to the officers of the Company generally. He remarked that the Company were fortunate in many ways, but he thought in none more so than in their officers. Their Secretary was an easy master of all the intricate questions of account that arose between the parent Company and the different stations. He was sure they were glad to see Mr. Chamberlain with them again that day, after the recent indisposition that had separated him from his work for some weeks. They all hoped he would entirely recover. As to the officers at the stations, they had shown, in the discharge of their duties, a large amount of ability, zeal, and devotion. Their carbonization work was exceptionally good, as was testified by the accounts.

Mr. L. R. WILKINSON seconded the motion, which was unanimously carried.

The SECRETARY briefly replied; and the proceedings terminated.

The Sheffield Tool and Gas-Engine Company, Limited, has been registered with a capital of £5000, in £1 shares, to acquire the business recently carried on by Mr. F. Cam, at Porter Lane, Sheffield, as the Sheffield Tool and Gas-Engine Company.

PROFIT SHARING AT CHESTER.

The fortunate profit-sharing employees of the Chester Gas Company met last Tuesday (under the presidency of Mr. J. G. Frost), to receive the Committee's sixth annual report and the statement of accounts.

The report stated that the bonus for the year, calculated at the rate of 5 per cent., amounted to £294 7s. 6d. There was now a sum of £854 12s. 9d. standing to the credit of 68 profit sharers, in addition to £270 of the Company's ordinary stock purchased by members since the inauguration of the scheme. The ideal of the scheme was to enable every employee to become one of the proprietors of the undertaking, and consequently feel the interest of a partner in the prosperity of the concern. Several employees had already purchased stock; and a considerable number had a sufficient sum to their credit to purchase £10 of stock. The Trustees had secured a further amount in anticipation of purchases, which they would be able to transfer at the price of £11 5s. for each £10 of stock. The scheme was intended for the permanent benefit of all working under it; and while the Committee would always favourably consider any applications for the withdrawal of sums of money for investment in stock or other property likely to be of real benefit to the employee, they wished to seriously caution those workmen who continually withdrew the whole amount on which they could lay their hands, without receiving any apparent benefit, that such action must jeopardize the success and stability of the scheme, as well as their own participation in its benefits. With coal at its present high price, the co-operation of every employee was sought in encouraging the use of gas and the sales of coke and other residuals, as without increases in these departments the Company would be unable to continue the supply of gas at the present price. Any increase in the price of gas would, of course, mean a corresponding reduction in the rate of bonus; but with the assistance of all employees in effecting economy and securing expansion of business, it was hoped to avoid the necessity of raising the price of gas, unless the cost of coal continued to increase. The Committee concluded by expressing their warmest sympathy in his indisposition with Mr. John Gamon, the Chairman of the Company, whose keen interest in the inauguration and success of the scheme, and in the welfare of all the employees, had contributed so largely to the present satisfactory report.

The Chairman, in moving the adoption of the report, said that Mr. Gamon, the cause of whose absence they so deeply regretted, had been very keenly interested in the well-being of the men employed in the Company's service. The introduction of the profit-sharing scheme was the result of many years' inquiry and consideration of various methods of improving their position. The Directors were only too pleased to adopt any scheme which would have the effect of creating a bond of interest between the Company and the employees; but the details of the scheme, the arrangements for starting it, and the care and watchfulness which had brought it to its present condition, had been undertaken and carried out by Mr. Gamon. He strongly urged them all to feel the necessity of always doing the work in hand in the best manner possible. Only thus could a man raise himself. Another most important point to remember was that with improved position came greater responsibility; and neglect or carelessness by a man placed in a leading position could not possibly be overlooked. Also all men whose work brought them in contact with the consumers and public generally had great responsibility and additional need of care, as the Company were, and must be, largely judged by the character and behaviour of officials, clerks, and each individual workman. Nothing was more detrimental to such a concern than for the employees to do their work in a negligent manner, or to act in any but a strictly respectful and honest, straightforward manner. They would see that the Committee again alluded in the report to their anxiety that the scheme should be a permanent benefit to all. They wished to encourage the purchase of the Company's own stock, because this meant that the men would be working for their own concern. If they all held a little stock—say, only £10 each—they would then know that in all their work they were benefiting their own property. The shareholders had then no further interest than the employees. Shareholders, directors, officials, and workmen in this way became absolute co-partners. The ownership of property was beneficial, and added to a man's feeling of responsibility. None could secure it without effort and self-denial, which in themselves helped to make a man better. Very necessary reference was made in the report to the continual withdrawal of all the cash which was under the control of the employees by a certain number, which, though small, was far larger than it ought to be. A man who, while in the receipt of regular wages, felt it necessary to withdraw every shilling he could from such a fund as this, would be in an absolutely pitiful position in case of serious misfortune. Sir George Livesey, who really introduced profit-sharing eighteen years ago, gave Mr. Gamon valuable assistance, and evinced keen interest when he started the scheme at Chester. Speaking of the distribution for the year of the sum of nearly £49,000 among some 5000 employees of the South Metropolitan and South Suburban Gas Companies, Sir George said: "The happy thing is that the greater part of that is saved. Of course, every man here is thrifty, and has a thrifty wife, who co-operates with him thoroughly in the matter, for only the thrifty are invited. There are some who would get hold of the money, if they could; but they are getting fewer and fewer. But in both Companies now practically the whole of the bonus is saved and invested. Saving is good, when it helps men to rise to a better position in life, to do more for their children, to place them in a more independent position, and to give hope for the future. Those are things we want to see accomplished. I am gratified to think that our workmen have co-operated with us so heartily, and that in so many cases man and wife pull together."

The report was adopted; and a vote of sympathy was passed with Mr. J. Gamon.

The business concluded with a vote of thanks to the Chairman.

Messrs. John Hall and Co., of Stourbridge, are issuing a coloured illustrated sheet, showing some of their principal fire goods.

A COALITE SHAREHOLDERS' DEFENCE COMMITTEE.

Referring to the affairs of the British Coalite Company, Limited, the "Daily Chronicle," in their City Article last Thursday, stated that a Shareholders' Defence Committee had been formed, the Secretary of which had issued a circular, "in which serious allegations are made regarding the promotion and formation of the Company, and its prospects are set forth in a most dubious light." Our contemporary's remarks are as follows.

Judging by the report of the statutory meeting of the British Coalite Company, the shareholders may still be chuckling with delight at the wit of the Chairman. He expressed the deepest regret that the Company would ruin the chimney-sweeping trade; and advised chimney-sweeps not to bring their sons up in the profession. (Shrieks of laughter from delighted shareholders.) Then he cracked some jokes regarding "little Carbo." There were more yells of hysterical merriment; and doubtless many present dug their neighbours in the ribs, and asked them if they had seen the point. But a certain section of the proprietors appear so lacking in sense of humour that they are not satisfied. A circular is issued by the Secretary of the British Coalite Shareholders' Defence Committee, in which serious allegations are made regarding the promotion and formation of the Company, and its prospects are set forth in a most dubious light. Shareholders who are dissatisfied with their investment are invited to communicate with the Secretary of this Committee, at 20, Great Winchester Street; and, if they feel disposed to do so, express their willingness to act upon the Committee. We should certainly advise them to take this course, in order that the charges which have been made regarding the concern may be properly and thoroughly investigated. Of whom the Committee consist at present, we do not know; but there will be no harm done in shareholders getting into communication with it as it stands, and hearing further details regarding its action. In order to hold the balance fairly, however, we feel bound to ask the Committee where it was when the statutory meeting was held? There was no sign of its existence then (unless it was represented by an occasional "Oh! oh!"), and that was an opportune moment to set forth its views.

GAS-WORKERS' WAGES AND DIVIDENDS.

An Unfortunate Socialistic Argument.

A lengthy letter to the "Standard," under the heading of "What Socialism Means," contributed by Mr. "Jack" Williams early this month, led to a number of replies to his arguments being made by other correspondents through the columns of our contemporary; and the controversy was by no means brought to a conclusion by Mr. Williams's subsequent answer to his critics. Mr. Williams is one of the men who have gained some notoriety as orators on socialistic questions; and his communication to the "Standard" dealt with a matter which was at the time being discussed by different correspondents in the pages of that paper—namely, "What Socialism means."

Mr. Williams argued that the task of the Socialist was to convince the people of the necessity of stepping in to take control of the production of wealth, and administer it in the interests of the whole of the people. His experience taught him that the working class would carry on every industry in the country with ease, if all the capitalists disappeared to-morrow. The existing local bodies, he said, even now could compete the capitalist out of existence. What municipality was there at the present time which could not with ease instal any electricity undertaking, or build any railway or public building? The municipalities under the control of the people so successfully outstripped the individual contractor and capitalist, that they got up agitations to prevent them from carrying on public works—thus openly proclaiming their incapacity to compete with organized production carried on under the control of the people. Upon the subject of capital, he said: "When analyzed, capital only resolves itself into unpaid labour. The bigger the capitalist, the bigger the labour thief He becomes a legalized labour thief in this way: By giving him a wage, he hires the labourer, who has to accept the terms offered on account of his economic necessities. In return for his wage, the worker produces as much wealth as he can in the form of commodities, which are placed on the market and turned into money. This money return to the capitalist, on the average, amounts to more than four times the amount paid in wages, besides including the value of the plant and raw material absorbed in the production of the commodities. This robbery is proved by statistics based on the income-tax. Using round figures, the amount of wealth produced in Great Britain every year is 2000 millions sterling; the amount paid in wages is 500 millions. No wonder capitalists wax fat, and tell the labourer to be contented!"

With the intermediate letters, there is no need to concern ourselves here; but in his reply to the criticisms, Mr. Williams touched upon a matter that has brought forth the statement of fact which is reproduced below. Dealing with municipal trading concerns, Mr. Williams said he was not concerned as to whether they made a profit; but they were a step towards Collectivism. He recognized fully that they were under capitalist management, and exploited the workers equally as much as other undertakings. In support of this, he quoted Mr. Will Thorne, M.P., the Secretary of the Gas Workers and General Labourers' Union, as stating that the profits and wages for six months ending December of the Gaslight and Coke Company were as follows:—

Wages	£104,984
Salaries	64,760
Shareholders' profits	561,209

"If," said Mr. Williams, "we add the first two items together, and compare the total with the third, we find that the workers are exploited at the rate of about 350 per cent. for the benefit of the shareholders, leaving out of account high salaries for officials." This he followed up by citing figures relating to the Bermondsey municipal electricity

works, which he argued proved that in that case there was a "rate of exploitation of close upon 470 per cent."

It was the reference to the Gaslight and Coke Company that induced Mr. C. de Broë, of Eastbourne, to pen a letter which appeared in the "Standard" last week, and in the course of which, after remarking that it was absurdly untrue to say that the whole capitalist world was in a conspiracy to defraud labour of its just due, "which can only be given the semblance of verity by the nuisance of distorted statistics," he said: "I have taken the trouble to procure a copy of the published accounts of the [Gaslight and Coke] Company for the period in question; and I find that the aggregates quoted for disbursements are apparently made up from the following items alone:—

Wages for gas making and sundries . . .		£104,984
Salaries—		
Engineers and others at works	£14,885	
Officers and clerks engaged in distribution	42,091	
Officers and clerks engaged in management	7,782	
		64,758
Amount acknowledged by J. Williams . .		169,742
Items left out of account—		
Purification £27,300, including for labour .	£12,767	
Collectors and cashiers	22,620	
Annuities to officers and workmen . . .	24,564	
Workmen's compensation account . . .	1,227	
Public officers	1,847	
		63,025
Making together for itemized wages, salaries, and grants		232,767
To this must further be added an unitemized proportion, expended in labour of various kinds, of the following charges:—		
Repair and maintenance of works and plant, materials, and labour. . . .	£181,483	
Repair and maintenance of mains and service-pipes	69,988	
Repair and renewals of meters and stoves	72,594	
Repair and lighting of public lamps . .	19,401	
Stationery, printing, and general charges	10,045	
Say, only 20 per cent. for labour upon .	£353,521	= 70,704
Thus giving a grand total disbursed for workers of, say		£303,471

as compared with £353,940 (not £561,209) available for dividend on the ordinary share capital, and £334,468 actually distributed to the shareholders.

"Where is now the exploitation of the workers to the tune of 350 per cent.? My proportion of 20 per cent. for labour out of the above items is, of course, a mere estimate. It may be much more, but is hardly likely to be very much less; and if Mr. Williams desires to ascertain the real figures, I have no doubt the Secretary would do his best to furnish him with such particulars as the books could supply. It may also be pointed out that the Company paid in rates and taxes for the half year £136,742, and that the total expenditure amounted to £1,352,777 for the production of a gross profit of £561,209; while the Directors' allowance did not exceed £2750 altogether.

"Now let us probe the matter to the bottom, and we shall see what a mare's nest has been discovered by Messrs. Thorne and Williams between them. In the undertaking there are embarked £26,000,000 sterling, of which a little over £15,300,000 represents ordinary share capital; the rest being in debentures and preference stocks, entitled to fixed or preferential rates of interest, ranging from 3 to 4 per cent. Of the half-year's gross profit of £561,209, there were required to meet these and some minor fixed charges £207,269; leaving available for dividend on the ordinary stock £353,940, or sufficient to pay (roughly) 2¼ per cent., or at the rate of 4½ per cent. per annum. As a matter of fact, the holders of ordinary stock have for the past five years received dividends at the rate of £4 8s. per cent. per annum—surely no excessive return for the risks involved. This is a sample of the 'usury' of which Socialists complain. Well, they have an opportunity of becoming usurers themselves on the cheap, for the stock is selling at a discount. But Mr. Williams objects on principle to the payment of any sort of interest on capital, as being 'unpaid labour.' How would he have proposed to raise the £26,000,000 put into this concern, unless he had offered some return thereon? Even the State itself could not undertake public works of any magnitude without having recourse to loans; and if no interest were offered, there would not be sufficient moneyed maniacs in the country to subscribe. The State would doubtless get the required capital somewhat cheaper than a joint-stock company. But it would not get it for nothing; and the less it paid the more it would restrict its borrowing resources, driving money elsewhere in search of more profitable employment."

Bexhill Water and Gas Company.—At the half-yearly meeting of this Company last Thursday, it was stated that the receipts amounted to £9779; being an increase of £613 compared with the corresponding period of 1906. The expenditure in connection with gas was £180 more than before, and with water £220 less. The Chairman (Mr. A. H. Kersey) stated that, so far as revenue was concerned, the Company had done better than was expected, and therefore they were justified in paying the proposed dividends—viz., 8 per cent. on the £34,000 of capital authorized by their Acts of 1885 and 1892, and £5 12s. per cent. on the £95,100 authorized by their Act of 1896 and their Order of 1901—free of income-tax. This was agreed to.

Alliance and Dublin Consumers' Gas Company.—In the report drawn up by the Directors for submission at the meeting of the Alliance and Dublin Consumers' Gas Company yesterday, it was stated that the gross revenue for the half year to June 30 amounted to £146,978; while the expenditure, including interest on loan capital, &c., was £114,397. This left a balance of profit of £32,581, to which had to be added £770 carried forward from the previous accounts, making a total to the credit of profit and loss of £33,351. The Directors recommended the payment of the usual dividends of 10½ and 7½ per cent. per annum on the respective shares, which would involve the withdrawal of £3556 from the reserve fund, leaving a balance to the credit of that fund of £57,496.

THE FUTURE OF THE CEMENT INDUSTRY.

At the Ordinary General Meeting of the Associated Portland Cement Manufacturers (1900) held last Friday, the Chairman (Mr. F. A. White) made some interesting remarks on the future of the cement industry, in which gas undertakings are concerned from the fact that coke is extensively used in the manufacture of cement. He said there had been an increase in the world's use of cement; and not only had a larger quantity been shipped from England to meet the American demand, but the shipments made to that market from other European countries had diminished, to an extent, the competition which British cement encountered in all parts of the globe. He wished he could state that the activity in the home trade had equalled that in their exports; but this, he regretted to say, was not the case, for he feared that the building trade of Great Britain had been still declining, and that they must attribute to foreign demand much of the improvement in their position. Another essential factor in their business was the quality of their product. Science had wrought wonders in most industries, and in none more than in their own; and the number of experienced chemists and practical engineers who were constantly investigating the *desiderata* and possibilities in connection with portland cement was never so great as at present. Though it might be supposed that two generations would have sufficed to teach men how to mix ingredients and burn and grind them so as to produce a perfect cement, it was not even the case that a full accord had been attained as to what constituted a perfect cement; and scarcely a month passed that did not produce some new problem to tax the intelligence of the manufacturer. Since their last meeting, the deliberations of representative engineers and chemists on the subject of a standard specification for portland cement had been completed, and had culminated in the perfecting of a specification which, as revised, was now being generally accepted by the engineering world as one that would secure to engineers a quality on which they could rely. It had been called the "British Standard Specification for Portland Cement;" and from it arose the advantage, among others, that foreign buyers, by stipulating for it, could feel increased confidence in sending their orders to Great Britain. Turning to the subject of the future of the cement industry, the Chairman said he was able to confirm what he said last year about the increasing appreciation of cement concrete, reinforced with steel, as a building material. The new Post Office in London was being built entirely of reinforced concrete, at a saving of 20 per cent. It had been largely used at Woolwich Dockyard and Arsenal, and the Admiralty employed it for floors, jetties, and the like, and found the cost of their maintenance greatly reduced. What they wanted for the current year was to see cement used everywhere and for every suitable purpose. But then cement was costing much more to make, and was selling about 25 per cent. above the figure that would satisfy them at the present time; and, moreover, the quality now was so improved that the user might employ a distinctly larger proportion of aggregate in his mixture. Therefore the cost of construction need not be very seriously affected, and could in no case become really prohibitive. It was an encouraging fact that the Company's contracts in hand for forward delivery amounted to many hundreds of thousands of tons of portland cement; and there was every reason to believe that when they struck their quarterly balances at the end of this month, it would be found that they constituted a record figure. It was this growing use of cement in every land that enabled them to look forward to the continuous development of their industry in this country. It was true that cement was now manufactured in various regions where the possibility of its manufacture was not contemplated when he was a boy. But, in spite of local manufacture, there still seemed to be an immense scope for the importation of British cement in many parts of the world; and he trusted that the Thames and Medway would long continue to yield their chalk and their clay in the form of portland cement, in response to the emphatic demand of every continent.

TORQUAY WATER SUPPLY.

Opening of a New Storage Reservoir.

The formal opening of the new storage reservoir constructed by the Torquay Corporation in the Trenchford Valley, on the borders of Dartmoor, took place on Thursday last. It is just four years since the work was begun; the first sod having been cut on Oct. 1, 1903. Mr. W. Ingham, now of Port Elizabeth, South Africa, was responsible for the design, and the work was started under his superintendence as Water Engineer to the Torquay Corporation, and has been continued under the supervision of his successor, Mr. S. C. Chapman. The reservoir has a storage capacity of 200 million gallons, and increases the total storage to 500 millions; the population at present supplied being about 53,000. In area, the reservoir is 30 acres, and the maximum depth of water is 50 feet. The embankment is 300 feet wide at the base and 20 feet at the top, while it is 520 feet long and rises to a height of 135 feet from the lowest part of the foundations. Considerable difficulty was experienced in its construction; and owing to the nature of the ground, the excavation of the trench had to be carried in places to a depth of 111 feet. The embankment has a water-tight core of clay, keyed into a concrete tongue, which is carried down to a water-tight foundation. Granite pitching, 12 inches in thickness, forms the face of the embankment. The outlet pipes are carried through a cast-iron tunnel, 7 feet in diameter, which passes through the embankment; and the four draw-off valves are operated from the platform of a water-tower, which is carried to the level of the top of the embankment. A screening wall has been erected at the higher end of the reservoir; and on each of the streams entering the reservoir are gauges with self-recording instruments showing the discharge of the streams. The cost of the reservoir was estimated at £22,000; but, owing to difficulties experienced in obtaining a water-tight foundation for the embankment and other causes, it came to £53,000. This brings the total expenditure on the Torquay water undertaking to about £300,000, of which some £165,000 is still owing. The income last year was £18,000; the

water rate being in the borough 1s. 2d. in the pound, and in the outside districts 1s. 4½d.

A numerous company attended the opening ceremony. Mr. F. J. Crocker, the Chairman of the Water Committee, after referring to the history of the undertaking, said that the water which they would be able to store now would yield a supply for 256 days at an average consumption of 1,700,000 gallons. The whole of the watershed to the extent of 2300 acres had been purchased by the Corporation, and all human habitations removed from it. They had done their utmost to put Torquay in a position second to no place in the kingdom for the abundance and purity of its water supply; and for the next generation at least they were not likely to need further additions. Mr. Crocker warmly eulogized the services of Mr. Chapman and those who had been associated with him in the work of constructing the reservoir. The Mayor (Mr. J. Smerdon) then turned on the water and declared the reservoir open. He said that he had been one of the strongest opponents of the scheme; but the great difficulty they had to face was that the streams of water which they had now impounded might have been taken from them. They had now claimed it, and had it for their own for ever. As a souvenir of the occasion, a silver water jug was presented to the Mayor. A luncheon followed. Mr. Chapman, in responding to the toast of "The Engineers," spoke of the services rendered by the late Mr. Strachan, the Consulting Engineer, and said that although the work of constructing the reservoir had been costly, it had involved a great amount of labour. Mr. F. S. Hex, the Town Clerk, said the fact that the Corporation had acquired the entire watershed made it essential that they should secure the whole of the water which arose in these valleys. He was sure the burgesses would feel that the Town Council did the right thing in constructing the reservoir and thus obtaining the control of the whole gathering ground, instead of increasing the height of the Kennick reservoir, as was proposed as an alternative.

LYNN WATER-WORKS EXTENSIONS.

Last Thursday afternoon, the Mayor of Lynn (Mr. G. E. Rose), accompanied by most of the members of the Town Council and the borough officials, proceeded to Gayton, and formally inaugurated an extension to the water-works, which has been carried out at an expenditure of rather more than £5000. At the works, the party were received by Mr. G. Bristow (the Chairman of the Water-Works Committee), the Town Clerk (Mr. J. W. Woolstencroft), and the Borough Surveyor and Water-Works Engineer (Mr. J. H. Webb). A tour of inspection was made, under the direction of Mr. Webb, who explained the alterations and additions that had been made. Following a somewhat serious breakdown of the old engines, the necessity for providing additional plant was reported to the Water Committee in the early part of last year, and prompt action was taken in the matter. Plans and specifications were prepared and approved by the Local Government Board, a loan was sanctioned, and the extensions were speedily begun. They comprised a new slow-speed differential pumping-engine by Messrs. Hathorn, Davey, and Co.; an additional well, 110 feet deep; an enlargement of the engine-house; the installation of a new boiler; and several minor improvements. The chief item of expenditure was for the new engine, which cost £2871. The whole of the work was done under rather trying conditions. The water-works being 7½ miles from the town, supervision was a difficult undertaking. The whole of the drawings, quantities, and specifications were prepared by Mr. Webb and the staff of his department without assistance or extra charge upon the Corporation. The town is now in possession of efficient plant, and the old engines can be used as a stand-by in case of need. The water, which is perfectly pure, if somewhat hard, is lifted from the wells, and is forced without filtration uphill to the reservoirs at Middleton, whence it reaches the town at considerable pressure.

At the conclusion of the inspection, Mr. Bristow said the Water Committee hoped that what the visitors had seen had met their approval. He was glad to be able to say that the work had been carried out without hitch or accident, though the elements of danger had been present. The town was now in possession of plant capable of supplying the inhabitants with water for many years to come, without the necessity for any expenditure beyond that entailed for ordinary wear and tear. He thought it was necessary that it should be known that the entire works had been carried out solely on the responsibility of the Borough Surveyor (Mr. Webb); and he must mention that extra work and anxiety had fallen upon the foreman and his men, which had been cheerfully borne by them, and also upon the members of the Water Committee. He had much pleasure in asking the Mayor to start the new engine, and in requesting the company to drink to a successful life to it.

The Mayor then turned a wheel, the engine began to work, and the assembled company honoured a toast suitable to the occasion. The Mayor then said it gave him much pleasure to assist in starting the engine. They were standing upon one of the most magnificent watersheds in the country. There was practically an inexhaustible store of water beneath them, and their friends in Lynn might rest assured that they would get an adequate supply of the purest water it was possible to obtain. It must be admitted that the work reflected the greatest credit upon the Borough Engineer, who had carried it out in a manner which he (the Mayor) believed would give the greatest satisfaction. The estimated cost was £5000; and it was gratifying to know that though there were five contractors, the whole of the extensions had been carried out at a cost of £5025, and the little additional outlay was due to some extra work that had to be done. They had cause to congratulate themselves as a town upon the efficient way in which the work had been carried out.

Mr. W. S. V. Miles, in proposing a vote of thanks to the Mayor for performing the ceremony, recalled the fact that during his own mayoralty in 1894 he had the honour of cutting the first turf for the water-works. If was the most eventful thing in his mayoralty this commencement of an undertaking which was for the welfare and health of the entire borough. No inhabitant would ever regret the day they started a new water supply for Lynn, and got rid of the filthy stuff they used to draw from the Gaywood River.

Mr. E. Dunn proposed "The Health of the Chairman of the Water-Works Committee," and in doing so referred to the troublous times the town passed through during the typhoid epidemic. In responding to the toast, Mr. Bristow said he had been thoroughly well supported by the members of the Committee, but for whose assistance and co-operation he should have resigned his position.

NEW WATER SUPPLY FOR MANILLA.

Early last year the Municipal Board of Manilla, in the Philippine Islands, let contracts for a large addition to the water supply of the city. We learn from "Engineering Record" that the work is well under way, and it is expected to be completed about the middle of next year. The new supply is to be taken from the Mariquina River, about 16 miles north-east of Manilla, and will be brought to the city partly through a riveted steel pipe-line and partly through a free flowing conduit. The work necessitates the construction of a dam at a gorge in the river, creating a reservoir with a capacity of about 2000 million gallons, and the construction of a distributing reservoir about a mile from the present one. In conjunction with the new water-works, the sewerage system is to be extended to all parts of the city; and, on account of the low elevation, it will consist of a combination of gravity and pumping systems.

The dam which will create the impounding reservoir has a length of 400 feet on the crest; the central portion, 160 feet in width, being designed as an overflow or waste weir with its crest 15 feet lower than the remainder of the dam. The maximum height above the bed of the stream is approximately 75 feet; and the elevation of the reservoir is about 212 feet above sea level. The foundation of the dam is a bed of solid rock, which was thoroughly cleaned of all dirt and *débris* and washed before the work was started. The bonding of the masonry to the foundation was further secured by stepping and grooving the rocks after all fissured and unsound portions had been removed. The excavation for the foundations amounted to about 16,000 cubic yards, 11,000 cubic yards of which consisted of solid rock. The dam is built of rubble concrete masonry containing about 50 per cent. of large stones laid in irregular fashion so as to avoid continuous joints through the structure. The stone is a high grade of limestone. The concrete is a 1 to 2½ to 5 mixture; the aggregate being gravel and broken stone, in sizes varying up to 2 inches in maximum dimension. The upstream top and down stream faces are built of coursed rubble made with stone, dressed so as to make ¾-inch joints, for a depth of at least 4 inches. After laying, the joints were raked out to a depth of 2 inches, and pointed with a 1 to 1 cement mortar.

The gate-house controlling the flow from the reservoir to the pipe-line is built as part of the dam at one end of the spillway section. It measures 27 feet by 40 feet in plan; the longer dimension being parallel to the axis of the dam. Two pipe-lines run through it—one a 42-inch line carrying the supply to the city, and the other a 36-inch pipe serving as a waste line, and discharging into the river a short distance below the dam.

The pipe-line consists of a 42-inch riveted steel main 10¼ miles long, discharging at the end nearer the city into a conduit which follows the hydraulic gradient. For about two miles it runs along the valley of the Mariquina River, and then starts across country in a direct line for Manilla; passing under the Mariquina River through a 36-inch cast-iron pipe. Through all parts of its length it is between 50 and 100 feet below the hydraulic gradient; a depth of about 100 feet being maintained for all but a short distance of the line. The pipe is made of plates about 0·2 of an inch thick of two courses—the smaller fitting into the larger—each corresponding to the width of plates from which the pipes are made, being about 60 inches long. The longitudinal seams are double riveted, and the circular seams single riveted, except at curves, where circular seams are double riveted at the bevelled joints, the rivets used being 7-16ths inch diameter. The pipes are made in Manilla, and transported to the work in sections 20 and 30 feet long, depending upon the transportation facilities and the condition of the roads. The pipe is caulked at all seams inside and out before being coated, and tested at the shops to a hydraulic pressure of 100 lbs. per square inch. After being laid in the trench, the pipe is again tested (the field riveting having been completed) to a pressure of 75 lbs. per square inch. Blow-off pipes are provided at all sags in the line, and air-valves at all summits; these in all cases being enclosed in suitable wells. The blow-off pipes are 6 inches diameter, and are discharged into convenient watercourses. Brick manholes, 14 in. by 16 in., are spaced approximately 500 feet apart throughout the entire line. The excavation for the pipe-lines amounted to about 58,000 cubic yards of earth and 18,000 cubic yards of rock. The minimum covering of the completed pipe is 2 feet.

The crossing under the Mariquina River near San Mateo is made through a 36-inch cast-iron pipe about 500 feet long, at each end of which reducers join on to the 42-inch riveted steel pipe in gate-houses, through which the valves controlling the 8-inch blow-off pipes are controlled. These houses are circular, 8 feet in diameter, and surmount the 6-feet concrete walls in which the valve mechanism is set.

From the end of the pipe-lines to the distributing reservoir water flows through a concrete aqueduct constructed in tunnels the entire distance of four miles. A portion of the work is done by the "cut and cover" method; but the greater part by tunnelling carried on from 12 shafts. The total amount of earth and rock to be moved is about 34,000 cubic yards. The conduit has a horseshoe section about 4 ft. 6 in. wide, and a maximum height of 4 ft. 10 in. In solid rock sections, the conduit is lined with a coat of 1 to 1 cement mortar; while in those parts where a full concrete section is required, the same mortar finish is applied to the concrete. Where the line runs through loose material or a soft bottom is encountered, the concrete is spread out to afford an adequate foundation; and in places where the conduit runs through a section of rock overlaid with loose material, the "cut and cover"

method is used, excavating the lower part of the conduit in solid rock, and building a concrete roof having the same interior arch as the other sections. The minimum thickness of concrete at the crown of the arch is 6 inches. The syphon is composed of two 42-inch cast-iron pipes connected to the conduit by means of concrete syphon chambers, 8 feet wide and 8 feet high, to which access is had by means of 24-inch manholes.

The distributing reservoir is located about a mile east of the present reservoir, and 1½ miles outside the city limits of Manilla, at an elevation of about 112 feet above the level of the sea. It is rectangular in plan, measuring 504 ft. by 769 ft. and 20 ft. deep, and has a capacity of 50 million gallons. It is built on ground sloping to the south, with a maximum difference in elevation of 15 feet. The bottom of the reservoir is about 25 feet below the natural surface where the ground is highest, and about 8 feet where it is lowest; consequently the greater part of it lies in excavation, and only portions of the banks are carried up above the natural surface. The banks slope 1 to 1, and in the rock section are covered with a thin coating of cement mortar, while the other parts of the banks are lined with a 4-inch layer of 1 to 2½ to 4 concrete. Expansion joints are left in the lining at intervals of 20 feet. Where the top of the reservoir is above the natural surface of the ground, an embankment is built up in the customary manner by placing thin layers of good earth and watering and rolling them thoroughly. A 10-feet drive-way on a 10 in 100 slope leads down inside the embankment, so as to allow access to the bottom of the reservoir for waggons should it be necessary to make repairs. The excavation here involved amounted to 29,000 cubic yards of earth and approximately 235,000 cubic yards of rock.

The water supplied to the conduit is measured before entering the reservoir over a weir built into a concrete chamber, which is surmounted by a suitable building. The weir-box is 12 feet wide and 29 feet long from the end of the conduit to the weir. The latter consists of a steel plate bolted to plates set into the concrete of the chamber; the notch being 6 feet wide and 2 feet deep. The crest is approximately 3 ft. 3 in. above the bottom of the chamber.

The flow into and out of the reservoir is controlled from a single gate-house located at the corner of the dam toward Manilla. The aqueduct, the gates of the reservoir, and the supply-pipe leading to Manilla all meet in a riveted steel distributing tank, and are fitted with suitable valves for diverting the flow as desired. The aqueduct enters immediately below the floor of the building, which is on a level with the top of the embankment, and terminates in a concrete chamber, across one end of which is a screen shutting off a second chamber, from which a 42-inch cast-iron pipe leads down to discharge into the tank near the bottom of the latter. The discharge into the reservoir from the distributing tank is controlled by a cylindrical valve, and by a flap-valve on the end of the pipe in the reservoir. The flow into the main leading to the city is governed by a flap-valve, which can be raised by mechanism on the floor of the gate-house, and by a 36-inch gate-valve located outside the steel tank in the concrete chamber. A 12-inch overflow-pipe is attached to the tank, and an 18-inch drain-pipe is connected with the line joining the tank to the reservoir.

The gate-house is built with semicircular ends, 47 ft. 8 in. on the longest and 26 ft. 8 in. on the shortest dimension. The water will be conveyed to the city from the new reservoir in a 42-inch cast-iron pressure pipe; the supply in the city being wholly by gravity due to the elevation of the reservoir.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

A writer in the "Scotsman" of yesterday, over the signature of "Architect," discloses what appears to be an unfortunate deadlock between the two lighting authorities in Edinburgh. His statement is that the Electric Light Department have recently been urging architects and others to instal the electric light on the staircases of ordinary tenements, making it a condition that on no account should gas for lighting purposes be introduced into the houses. In the case of some tenements with which the writer has to do, this led to curious results, as later on a representative from the Gas Commissioners called and asked that gas-pipes should be introduced into houses for cooking purposes. As the houses in course of erection were intended for working-class tenants, this seemed a desirable thing to do; and instructions were given to the Gas Commissioners to introduce gas to the whole of the houses—twenty-nine in number. In response to this request (instruction), however, the writer had received a letter from the Chief Engineer, in which he stated: "My inspector reports to me that there is no probable consumption other than the prospective use of a grilling stove. I regret to say, therefore, that unless provision is made for lighting the kitchen by gas, I cannot see my way to advise the Commissioners to lay a gas connection to the property at all, seeing that the public stair is to be lighted by electricity." The writer considers this an extraordinary position to take up, as if gas be introduced into the kitchens for lighting the Electric Light Department refuse to light the staircases. Why, he asks, should there be rivalry between the two departments, seeing that they are under the same Corporation. The Gas Commissioners, he adds, push the sale of ranges with gas, and otherwise interfere with the arrangements of private traders, which in his opinion seems undesirable from the public point of view.

The Bervie Gas Company have advanced the price of gas by 10d. per 1000 cubic feet, on account of the rise in the price of coal. It is now 8s. 4d. per 1000 cubic feet.

The Directors of the Newburgh Gas Company on Monday agreed to raise the price of gas from 5s. to 5s. 10d. per 1000 cubic feet, and to grant a discount of 5 per cent. to consumers of 10,000 cubic feet per annum.

On Wednesday, in pursuance of a movement initiated by Councillor Ferguson, a party of forty scholars from the North Clepington School at Dundee visited the Dundee Corporation Gas-Works. The scholars were met by Councillor G. Stevenson, the Convener of the Gas Committee, and by Councillor Ferguson. The Engineer and Manager—Mr. A. Yuill—showed them round and explained the plant and its working.

On Saturday last, two men employed by the Automobile Gas Syndicate, Limited, of Commerce Street, Glasgow, while engaged in filling tuns with petrol spirit, were overcome by the fumes. They were attended to medically, and one of them soon recovered. The other was taken to the Royal Infirmary; but after receiving treatment was able to go to his home.

Mr. J. W. Crombie, M.P. for Kincardineshire, in the course of an address to his constituents at the end of last week, said that if he thought the restoration of the coal duty would reduce the price of coal at home he would restore it; but he felt certain it would not. He could not

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 18.

Issue.	Share	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
500,000	10	Apl 11	10½	Alliance & Dublin 10 p.c.	20—21	..	5 0 0
268,324	10	,,	7½	Do. 7 p.c.	13⅞—14½	..	5 3 5
200,000	5	May 5	7	Bombay, Ltd., . . .	6⅞—7	..	5 0 0
40,000	5	,,	7	Do. New, £4 paid	4⅞—5¼	..	5 6 8
50,000	10	Aug. 29	14	Bourne- mouth Gas and Water } 10 p.c. . .	27½—28½	..	4 18 3
51,810	10	..	7	B 7 p.c. .	16½—17	..	4 2 4
53,200	10	..	6	Pref. 6 p.c.	14½—15½	..	3 17 5
380,000	Stk.	Aug. 15	12½	Brentford Consolidated	247—252	..	4 19 2
300,000	,,	,,	9⅜	Do. New . . .	185—190	..	5 0 0
50,000	,,	,,	5	Do. 5 p.c. Pref. .	115—120	..	4 3 4
206,250	,,	June 13	4	Do. 4 p.c. Deb. .	103—104	..	3 17 8
220,000	Stk.	Sept. 27	11½	Brighton & Hove Orig.	215—220*	+	5 2 3
246,320	,,	,,	8¾	Do. A. Ord. Stk. .	155—160*	—	5 3 2
460,000	20	,,	10	British	40½—41½*	..	4 16 5
104,000	Stk.	Aug. 15	6	Bromley, Ord. 5 p.c. .	116—119	..	5 0 10
165,700	,,	..	4½	Do. do. 3½ p.c.	87—90	..	5 0 0
500,000	10	May 15	7	Buenos Ayres (New) Ltd.	11—11⅛	+⅛	6 1 9
250,000	Stk.	June 27	4	Do. 4 p.c. Deb. .	93—95	..	4 4 3
150,000	20	July 12	8½	Cagliari, Ltd. . . .	26½—27½	..	6 0 0
100,000	10	June 13	10	Cape Town & Dis., Ltd.	11—13	..	7 13 10
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref., .	8—9	..	5 0 0
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	50—52	..	5 15 5
50,000	Stk.	June 27	4½	Do. 4½ p.c. Deb. Stk.	94—96	..	4 13 9
157,150	Stk.	Aug. 15	5	Chester 5 p.c. Ord. .	106½—108½	..	4 12 2
1,443,280	Stk	,, 29	5⅛	Commercial 4 p.c Stk. .	101—106	..	4 18 1
560,000	,,	,,	5	Do. 3½ p.c. do. .	98—103	..	4 17 1
475,000	,,	June 13	3	Do. 3 p.c. Deb. Stk.	81—83	..	3 12 3
800,000	Stk.	,,	6⅛	Continental Union, Ltd.	112—117	..	5 11 1
200,000	,,	,,	7	Do. 7 p c. Pref.	138—143	..	4 17 11
460,170	Stk.	—	5⅛	Derby Con. Stk. . .	123—125	..	4 8 0
55,000	,,	—	4	Do. Deb. Stk. . . .	102—104	..	3 16 11
486,090	10	July 31	12	European, Ltd. . . .	22½—23⅝	..	5 2 2
354,060	10	,,	12	Do. £7 10s. paid	17⅝—18½	..	4 17 4
15,181,590	Stk.	Aug. 15	4⅛	Gas- light and Coke } 4 p.c. Ord. . .	93—95	..	4 12 7
2,600,000	,,	,,	3⅜	3⅜ p.c. max. . .	86—88	..	3 19 7
3,799,735	,,	,,	4	4 p.c. Con. Pref.	104—107	..	3 14 9
4,193,975	,,	June 13	3	3 p.c. Con. Deb.	81—83	..	3 12 3
258,740	Stk.	Sept. 13	5	Hastings & St. L. 3½ p.c.	93—98	..	5 2 0
82,500	,,	,,	6⅔	Do. do. 5 p.c.	114—117	..	5 11 1
70,000	10	Apl. 26	11	Hongkong & China, Ltd.	15—20	..	5 10 0
4,940,000	Stk.	May 15	8	Imperial Continental .	174—176	..	4 10 11
473,600	Stk.	Aug. 15	3½	Do. 3½ p.c. Deb. Red,	91—93	..	3 15 3
195,242	Stk.	Aug. 29	6	Lea Bridge Ord. 5 p.c. .	110—120	..	5 0 0
306,083	,,	June 27	4	L'rpool Unit'd Deb. Stk.	108—110	..	3 12 9

Issue.	Share	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
561,000	Stk.	Aug. 29	10	Liverpool United A . .	22'—223	+1	4 9 8
718,100	,,	,,	7	Do. B . .	160½—16 ½	..	4 6 8
152,736	Stk.	Feb. 14	7⅞	Maidstone 5 p.c. . .	142—147	..	5 3 8
75,000	5	June 27	5	Malta & Medn., Ltd. .	4—4½	..	5 11 1
560,000	100	Apl. 2	5	Met. of 5 p.c. Deb..	101—103	..	4 17 1
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	101—103	..	4 7 5
541,920	20	May 30	3½	Monte Video, Ltd. . .	10½—11½	..	6 1 9
1,775,892	Stk.	Aug. 15	4⅜	Newc'tle & G'tesh'd Con.	107—108	..	4 5 7
406,025	Stk.	June 27	3½	Do. 3½ p.c. Deb.	90—91	..	3 16 11
15,000	10	Aug. 29	10	North Middlesex 10 p.c.	19—20	..	5 0 0
55,940	10	,,	7	Do. 7 p.c.	12½—13½	..	5 3 8
300,000	Stk.	Apl. 26	8	Oriental, Ltd. . . .	140—145	..	5 10 4
60,000	5	Sept. 13	7	Ottoman, Ltd. . . .	5⅜—6⅞	..	5 12 0
398,490	5	May 15	7	Primitiva Ord. . . .	6¾—7¼	..	4 16 7
796,980	5	July 31	5	Do. 5 p.c. Pref. .	5 —5½	..	4 15 3
488,900	100	June 1	4	Do. 4 p.c. Deb. .	94—96	..	4 3 4
1,000,000	10	Apl. 26	8	River Plate Ord. . . .	13½—13⅝	+¼	5 16 5
312,650	Stk.	June 27	4	Do. 4 p.c. Deb. .	93—95	..	4 4 3
250,000	10	Sept. 27	8	San Paulo, Ltd. . . .	12⅜—13¼*	..	6 0 9
125,000	50	July 1	5	Do. 5 p.c. Deb. .	48—50	..	5 0 0
135,000	Stk.	Sept. 13	10	Sheffield A	242—244	..	4 2 0
209,984	,,	,,	10	Do. B	242—244	..	4 2 0
523,500	,,	,,	10	Do. C	242—244	..	4 2 0
70,000	10	June 13	10	South African	15—16	..	6 5 0
6,429 895	Stk.	Aug. 15	5⅜	South Met., 4 p.c. Ord.	119—121	..	4 10 11
1,895,445	July	12	3	Do. 3 p.c. Deb.	81—83	..	3 12 3
201,720	Stk	Sept. 13	8	South Shields Con. Stk.	155—157	..	5 1 11
605,000	Stk.	Aug 15	5⅜	S'th Suburb'n Ord. 5 p.c.	114—117	—1	4 14 0
60,000	,,	,,	5	Do. 5 p.c. Pref. . .	117—120	..	4 3 4
117,058	,,	July 12	5	Do. 5 p.c. Deb. Stk.	120—125	..	4 0 0
502,310	Stk.	May 15	5	Southampton Ord. . .	105—110	..	4 10 11
120,000	Stk.	Aug. 15	6⅔	Tottenham A 5 p.c. .	120—123	..	5 9 9
398,940	,,	,,	5⅓	and B 3½ p.c. .	100—103	..	5 1 11
149,470	,,	June 27	4	Edmonton 4 p.c. Deb.	99—101	..	3 19 3
124,380	10	June 13	8	Tuscan, Ltd.	10¾—.0¾	..	7 8 10
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	100—102	..	4 18 0
193,742	Stk.	Aug. 29	5	Tynemouth 5 p.c. max.	107—109	..	4 11 9
30,000	Stk.	Feu 14	8	Wands- A 5 p.c. . .	—	..	—
255,636	,,	Aug. 15	6⅔	worth B 3½ p.c. .	128—133	..	4 17 9
75,000	,,	,,	5⅝	and C 3½ p.c. . .	—	..	—
80,075	,,	June 27	3	Putney 3 p.c. Deb. Stk.	77—80	..	3 15 0
845,872	,,	Aug. 15	5⅜	West Ham 5 p.c. Ord.	101—104	..	4 18 6
185,000	,,	,,	5	Do. 5 p.c. Pref. . .	118—120	..	4 3 4
228,300	,,	June 27	4	Do. 4 p.c. Deb. Stk.	100—103	..	3 17 8

Prices marked * are "Ex div."

claim to be an expert in the complicated subject of the coal trade; but he did not speak without some knowledge, for he sat for many days on a Departmental Committee, the evidence before which threw a good deal of light on the subject. The conclusion he had come to was that the removal of the duty had practically nothing to do with the present rise in the price of coal. He attributed the existing boom to good trade, and to the peculiar and unique condition of our coal industry, which, even in a free country, gave it, from natural causes, the same sort of monopoly which enabled commodities to be cornered in protectionist countries. Coal was a commodity which no manufacturer could do without. He must have it, whatever it cost; and therefore the price could be raised to a high figure without in the least curtailing the demand. In most commodities this would be checked by imports from abroad; but, though they exported large quantities of coal, they practically imported none. This arose entirely from shipping freights, which acted as a premium against import but in favour of export. Added to all this there was the organization of the coal industry, which was unusually perfect; and they could take advantage of a boom for the increasing of prices.

The Glasgow Trades Council have followed the lead which is being given by certain members of the Town Council in the matter of the coal supply to the city. At a meeting of the Council on Wednesday evening, Mr. John Wilson, miners' delegate, moved that the Council urge upon the Town Council to adopt measures at once to own coal mines sufficient to meet the industrial and domestic needs of the city. It was stated, he said, that on an average Glasgow consumed 3 million tons of coal per annum. The cost of the scheme he estimated at one-and-a-half millions sterling; but he was satisfied that the people were paying 5s. per ton more for their fuel than they would pay if they owned their coal supply. Another member thought the motion did not go far enough, and moved, as an amendment, that the Government be urged to nationalize the coal supply. The motion was carried by a large majority.

There has been great scarcity of water in Peterhead for some time, to relieve which the Admiralty, who are engaged in the construction of a harbour of refuge in the locality, have, during the summer, given to the town the benefit of their surplus water. The water has been carted into the town, and has been so much appreciated that when intimation was made to the Town Council the other day that the privilege was to cease, as all the available supply was required at the harbour works, the Council passed a vote of thanks to the Admiralty for the facilities they had accorded. The Town Council have, after a good deal of consideration, agreed upon a scheme for augmenting the burgh water supply; and at a meeting of the Council on Monday it was intimated that Messrs. Walker and Duncan, of Aberdeen, the Consulting Engineers, had, with the authority of the Council, accepted the tender of Messrs. Shanks and M'Ewan, Contractors, of St. Vincent Street, Glasgow, for the carrying out of the complete works in connection with the scheme. The contract price was not divulged; but the thirteen tenders lodged by contractors in Edinburgh, Glasgow, Dundee, Aberdeen, and the district, ranged from £33,723 to £17,530. A condition of the contract is that the new water supply shall be available for use in the burgh on the last day of April next. The contract is really for a new water scheme, complete, with gathering works in the valley of Cairncatta, and seven miles of cast-iron mains, of 10-inch, 12-inch, and 14-inch diameter, for conveying the water to the burgh. The existing storage reservoir at Forehill, which lies a short distance from Peterhead, is to be increased from 2 million to 6 million gallons capacity, and will be constructed in two basins instead of one, as at present.

CURRENT SALES OF GAS PRODUCTS.

Week ending Sept. 28.

The London market for tar products is in a steady position. In view of the high rates of freight and the abnormal price of coal, the present value of pitch ought to be an attractive one to buyers—in fact, there are numerous inquiries for prompt and forward delivery. For October-December, the quotation is 27s. 6d. to 28s. net. Creosote oil is rather scarce; while there are large quantities wanted. The price is 3d. to 3¼d. net in bulk at makers' works. Business is reported to have taken place in 90 per cent. benzol at 8⅝d. to 9d. net per gallon. There is an increasing demand for this article for motor purposes. There is also a good inquiry for carbolic acid at 1s. 8d. to 1s. 8½d. Sulphate of ammonia is firm; the price being £12 1s. 3d. to £12 2s. 6d., on Beckton terms, for prompt.

LIVERPOOL, *Sept.* 28.

Sulphate of Ammonia.

There has been very little change in the market during the week. The demand has been sustained, and parcels offering have found an outlet at apparently previous prices; but beyond a slightly firmer tone, due to the necessity of covering the month's requirements, there is no appreciable alteration in the situation. Leith is the firmest point of delivery, owing to large shipments which have to be made from that port at an early date. Quotations remain £11 15s. per ton f.o.b. Hull, £11 18s. 9d. per ton f.o.b. Liverpool, and at Leith values are £12 to £12 1s. 3d. per ton. In forward delivery, makers maintain their quotations of £12 2s. 6d. to £12 5s. per ton, according to position, but no business from first hands is reported.

Nitrate of Soda.

This article is quiet but steady at 11s. 1¼d. to 11s. 4½d. per cwt., according to quality, *ex* store.

LONDON, *Sept.* 30.

Tar Products.

The markets for tar products remain quiet, and there is not much business doing. Pitch is decidedly weak. Sales are reported on the east coast at 25s. to 25s. 3d. for prompt delivery; and business has been done at 25s. 3d. to 25s. 6d. for delivery to the end of the year. On the west coast, very low figures are also reported to have been accepted.

An interesting photograph taken at night with "BLAND" Lights.

The Pavilion Clarence Pier, Southsea.

Lighted Entirely by "BLAND" Lights.

Perhaps among lights there's a few
The question is what can they do?
Unless you try Bland,
There is none in the land
Gives results that are equal to two.

We have oftentimes wanted a light,
Economical, cheerful and bright,
Just make a dead set,
And see that you get,
A Bland, and you're bound to be right.

BLAND & CO., LONDON & MANCHESTER.

London Show-Rooms: *63, QUEEN VICTORIA STREET, E.C.* Manchester Show-Rooms: *20, FENNEL ST., CORPORATION STREET.*

Creosote is steady, and some quantity is stated to have been sold in the Midlands for delivery all over next year at 3d. In Manchester and Liverpool, oil is reported to have been offered at prices equal to 2⅞d. to 2¾d., at makers' works. In London, there are sellers for prompt delivery at 2¾d. to 2⅞d.; but most manufacturers ask 3d. per gallon, though they do not appear able to obtain this figure for ordinary delivery. Benzol, 90 per cent., is still quiet, though not very much business is reported. Benzol 50's-90's and toluol are both depressed, as consumers are very full of stock just at present. Country makes of solvent naphtha are reported to have been offered in London at 1s. 1d. per gallon; but most London makers ask 1s. 2d. Heavy naphtha is pretty firm, and business is said to have been done at fairly good figures, especially for the high-flash variety. In carbolic acid, business is reported to have been done at 1s. 7½d. at makers' works in the Midlands, for delivery January-June; but Continental consumers will not pay the equivalent of this f.o.b. east coast. Naphthalene and salts are both steady. Nothing of importance has taken place in anthracene.

The average values during the week were: Tar, 15s. to 19s. 6d., *ex* works. Pitch, London, 26s. 3d. to 26s. 6d.; east coast, 25s. 3d. to 25s. 6d.; west coast, 24s. 6d. to 25s. 6d. Benzol, 90 per cent., 8d. to 8½d., casks included; 50-90 per cent., 8½d. to 9¼d., casks included. Toluol, 10d. to 10½d., casks included. Crude naphtha, 4d. to 4¼d., naked; solvent naphtha, 1s. to 1s. 1½d., casks included; heavy naphtha, 1s. 1d. to 1s. 2d., casks included. Creosote, London, 2¾d. to 3d., naked; North, 2⅝d. to 2¾d., naked. Heavy oils, 3¼d. to 3½d., naked. Carbolic acid, 60 per cent., 1s. 8½d. to 1s. 8¾d., casks included. Naphthalene, £6 10s. to £10 10s., packages included; salts, 35s. to 45s., packages included. Anthracene, "A" quality, 1¼d. to 1⅜d., casks included.

Sulphate of Ammonia.

This article is steady, though there appears to be a somewhat firmer tone in the market. The principal Gas Companies still quote £12 2s. 6d. to £12 5s., and report having refused £12 1s. 3d. Outside makes have been sold on Beckton terms for November-March delivery at equal to £11 13s. 9d.; but this was decidedly cheap. In Leith, manufacturers report having refused £12 for prompt delivery. They ask £12 2s. 6d. for prompt, and £12 5s. for forward. In Hull, business has been done in one of the best makes at £11 17s. 6d.; while in Liverpool, business has been done at £11 17s. 6d. to £11 18s. 9d.

We learn from the Secretary of the Amman Valley and Whitland and District Gas Companies (Mr. H. Percy Davies) that he has been informed by Mr. Frank G. Vivian, of Llanelly, the Engineer, that the works at Ammanford and Whitland will be opened within the next fortnight, and that contracts for meters, stoves, and complete slot installations have been placed with Messrs. Thomas Glover and Co., Limited, who will hold an exhibition at each of the above-named places on the occasion of the opening of the works.

COAL TRADE REPORTS.

Lancashire Coal Trade.

There is no practical change to note in the coal trade of the County Palatine. Owing to the fine weather, house fires have scarcely been required. Gas has done the cooking; and there has been a consequent lull in this department. The same lull has been experienced in cannel and gas coal. It is significant to note in this connection that the Manchester Corporation have just received a consignment of over a million gallons of oil, *viâ* the Ship Canal. Prices of coal in all sections of the trade remain according to last published quotations. Some uneasiness is felt as to what may be the outcome of the railway troubles.

Northern Coal Trade.

There is rather more activity in the coal trade of the north-east, though the mild weather has certainly lessened the consumption of some kinds of fuel. In the steam coal trade, best Northumbrian steams are quoted at from 15s. 10½d. to 16s. 3d. per ton f.o.b., second-class steams are 14s. 10d. to 15s. 3d., and steam smalls are from 10s. to 10s. 6d. Production is on a full scale at most of the collieries, some of which have sold their output well forward for the next three or four weeks. After that, the closing of the Baltic ports may affect this branch of the trade. As to gas coals, there is now a decided increase in the home consumption; and the deliveries on long contracts are growing towards their winter height. The exports are also steady. Prices of Durham gas coals vary from about 14s. 6d. to 15s. 9d. per ton f.o.b. for early delivery; but where forward delivery is stipulated, there is more disposition to concessions. With regard to contracts, one for Italy has been settled, for some 30,000 tons of good Durham coal, over the first half of next year, at a price of about 21s. 6d. delivered at Savona; but, with the current uncertainty as to freights, the f.o.b. price is very uncertain. Coke is in brisk demand, except for export, and gas coke is generally firm—the larger output being well taken up. Good gas coke is quoted from 19s. 6d. to 20s. per ton f.o.b. The inland prices of gas coke seem steady.

Scotch Coal Trade.

Trade is a little easier. The explanation is given that in foreign trade it is the scarcity of shipping which has led to a lessened demand; but, it is added, there is an indisposition to contract ahead. This is tantamount to an admission that the abnormal foreign demand is about exhausted. The market is thus more hopeful for buyers. The prices quoted are: Ell 14s. 6d. to 16s. 6d. per ton f.o.b. Glasgow, splint 15s. to 15s. 6d., steam 14s. 3d. to 14s. 6d. The shipments for the week amounted to 291,184 tons—a decrease of 6002 tons on the preceding week, but an increase of 7589 tons upon the same week of last year. For the year to date, the total shipments have been 10,646,854 tons—an increase of 661,248 tons upon the corresponding period of 1906.

"VOLCANIC" (Powder).——————"VOLCUM" (Paste).

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LEST YE FORGET.

The Legality of a Water-Rate.

The dispute which has arisen respecting the legality of the Great Torrington water-rate, resulted in an action which was tried in the County Court at that town yesterday week, before his Honour Judge Beresford. Some months ago, the rate was disputed by a former member of the Town Council, on the ground that it was based on the gross rateable value of property, instead of on the net value. In that instance judgment went against the Council, who, as the result, took legal advice, and decided upon a sliding-scale of charges. Mr. M. Passmore, a member of the Council, opposed this, and, refusing to pay the amount to which he was assessed, was now sued. Mr. Hopper, who appeared for the Corporation, said that the present scale of charges was made under section 56 of the Public Health Act, 1875. The rate varied according to the size of the houses; and Mr. Passmore was charged 3s. 4d. in the pound, while some properties did not pay more than 1s. 8d. Mr. Passmore paid only half the sum demanded, and contended that he should not be asked to pay at a higher rate than another person. Mr. James, for the defence, contended that the old scale of charges had never been rescinded, and in any case the sliding-scale was bad. Mr. Hopper argued that the question of the legality of the course pursued by the Corporation was decided by the case of the *Northampton Corporation v. Ellen*. His Honour held that this case governed the present one, and consequently gave judgment for the Corporation; but he granted defendant leave to appeal.

Derby Gas Company and the Belper Gas-Works.

At the meeting of the Belper Urban District Council last Wednesday, a resolution was adopted requesting the Belper Gas Company to enter into negotiations with the Derby Gas Company for the transfer of their undertaking to the latter Company. In addition, Mr. G. Herbert Strutt, who is the owner of private gas-works at Milford which supply a number of customers, offered to dispose of them to the Derby Company. It was suggested by a Committee who had investigated the matter that there should be negotiations between the Belper Company and the Directors of the Derby Company. There was permission to state that the Derby concern would deal with Belper in a manner similar to that in which Duffield, Mickleover, and Spondon had been treated. For every £100 worth of original shares in the Belper Company, paying 10 per cent., the Derby Company would transfer £200 of their original shares paying 5½ per cent. By such a transaction the Belper shareholders would receive 11 per cent.; and the town would have the advantage of lighting its street-lamps all night, and at a cheaper rate than now, if the two Companies could come to terms. Mr. Harrison, who presided at the meeting, read a long letter from Mr. Strutt, in which he expressed his willingness to dispose of his plant and to accept a proportion of the purchase-money in shares. He said a large Company like that at Derby could effect economies which were impossible at Belper, either by the Company or himself. A resolution was passed recognizing the advantages to be gained by adopting the suggestions of the Committee.

Public Lighting of South Normanton.

A little trouble has arisen at South Normanton in regard to the extinction of the public lamps at 8.30 p.m. on three nights just after the period of the full moon, in respect of which the Manager of the Gas Company (Mr. T. Jowett) has discretionary powers. His instructions were that the lamps were to be lighted at 7.30 p.m., and put out at 8.30 p.m. if the moon was visible. He was consequently in the ambiguous position of having to tell his men at five o'clock in the afternoon whether the moon would be clear at 8.30 p.m., or whether it would be obscured by clouds. If the moon was shining, then his men were to put out the lights. The matter came before the Parish Council at their last monthly meeting, in consequence of complaints which had been received as to the streets being in darkness. After a rather warm discussion, a resolution was passed to the effect that Mr. Jowett had done his best under the circumstances, and had faithfully exercised the discretionary powers given to him. It was recognized that the fault lay with the system, and not with the Gas Company. The attention of the Council was then directed to the alteration of the system. Mr. Vardy expressed the opinion that the lights should be kept on irrespective of the caprices of the clouds, moon, and other elements. On it being pointed out that this would cost £50, he said if they required convenience they must be prepared to pay for it, and £50 was putting the figure high. A rate of about ¼d. in the pound would suffice. Eventually, it was decided to instruct Mr. Jowett to have the lamps lighted on the three nights of full moon, the same as other nights.

Exmouth Gas Company.—Presiding at the half-yearly meeting of the Exmouth Gas Company yesterday week, Rev. C. R. Carr said that the increase of 2,708,000 cubic feet in the make of gas was satisfactory; and though coal had cost £312 more than in the corresponding period of last year, this had been compensated for to a large extent by the increase in the business of the Company. The price of gas had been steadily reduced, until it was now down to 3s. 5d. per 1000 cubic feet; and, with the advancing business, they did not intend to exceed this figure. The statement of accounts (which showed that over £700 had been carried to profit and loss for the half year) was adopted.

Workington Gas and Water Finances.—The abstract of accounts issued by the Borough Treasurer of Workington (Mr. John Noble), for the year to March 31, shows that the gross profit of the gas-works was £3137; and after paying interest and sinking fund, the net profit was £910. The profit was smaller than in the previous year; but the falling off was fully accounted for by the reduction in the price of gas. The make of gas was 103,164,000 cubic feet, the largest yet recorded. The capital is £17,691; being less than twelve years ago, when the make was one-half that of last year. The river water scheme shows a gross profit of £1174, and (after paying interest and loan charges) a net profit of £315. The Crummock water scheme reveals a gross profit of £3522, and (after interest and loan repayments) a net profit of £193.

Sawer & Purves,

NELSON METER WORKS,
MANCHESTER.

PREPAYMENT METERS

WET AND DRY

Fitted with Colson's Patent Cash Box if required.

Sawer & Purves,

RADFORD METER WORKS,
NOTTINGHAM.

Explosion at the Arbroath Gas Office.

An explosion of gas occurred in the office at the Arbroath Gas-Works on Friday morning, which inflicted injuries upon two men who were passing the place at the time. When two of the employees entered the office at 6 o'clock in the morning, they noticed a strong smell of gas. The door was left open, to allow the gas to clear away; and the supply was cut off at the meter. After waiting for some time, one of the men struck a match. Unfortunately, however, the gas was still present in sufficient volume to cause an explosion. There was little damage to property; it being mostly confined to the breaking of windows and the displacement of plaster. One of the men inside the office was slightly burnt by the flame. The other, who was beside the meter at the time, escaped unhurt. The two men in the street were thrown down, and were found, in addition to burns, to have been cut about the face by splinters of glass. One of them also had a cut on the leg, which was sustained in his fall.

Barry Gas Management.—The Barry Gas and Water Committee have received a letter from Mr. F. M. Harris, the Gas Engineer, asking the reasons for the notice which has been given him to terminate his engagement on March 31 next, in accordance with the report of the Council's proceedings which appeared in last week's "JOURNAL." He pointed out that he had served the Council for twenty years past, and stated that he was anxious for the fullest possible inquiry. The Committee referred the letter to the Council.

New Water Supply for Stockholm.—A complete description of the new water-works of the Swedish capital which has lately been published gives an account of an undertaking containing many interesting features of design and construction. The supply is drawn partly from wells and partly from a large lake. The well water is treated to remove the iron it contains, and the lake water is filtered; slow sand filters roofed over with steel trusses and skylights being employed. There is a pumping-station connected with the works, a long tunnel, a covered reservoir, inverted syphons, a reinforced concrete aqueduct, and many less important features.

Prepayment Charges at Coventry.—The Gas Committee of the Coventry Town Council reported to the meeting on Tuesday last that they had considered a letter from the Trades Council with respect to gas used through penny-in-the-slot meters, suggesting that the pressure of gas should be increased from Saturday to Monday, and that the rebates allowed to prepayment meter users should be increased in proportion to the quantity of gas consumed. They could not, however, see their way to depart from a resolution passed in June last, not to make any alteration in the present charges; and they recommended that the Trades Council be written to explaining the reasons which made it impossible for the Committee to adopt their suggestions. The minutes of the Committee were confirmed.

Penalty for Unlighted Lamps.—As a result of a discussion by the Uckfield Urban District Council, some slight alterations were made in a clause which the Highways Committee had recommended should be added to the contract for street lighting. The suggested clause provided that if the Gas Company wilfully failed or neglected to carry out their part of the agreement they should pay the Council 1s. per week for each lamp unlighted. Mr. Ware proposed that the penalty should be 2s. 6d.; but this was not carried. A further amendment, however, by Mr. Farr, to the effect that the clause should be altered so as to provide for the Gas Company to be penalized if a lamp was not lit for more than two successive nights, was carried. Mr. Horscroft proposed, and Mr. Ware seconded, that the word "wilfully" be deleted; and this was agreed to. A further amendment by Mr. J. W. Gould that the words "after due notice" be added, was then carried; and the contract in this form was approved of.

The Accident to the Highgate Reservoir.—Referring to the failure of the wall of the new reservoir at Highgate, noticed in the "JOURNAL" for the 17th ult. (p. 785), the "Builder" remarks that it was a strange kind of mishap, inasmuch as "one would suppose that the designer would naturally take care to provide adequate resistance for all conditions of earth and water pressure;" and further information was awaited in regard to the real cause of the accident. This has been furnished to our contemporary by Mr. J. Francis, M.Inst.C.E., of the Metropolitan Water Board, the responsible Engineer for the reservoir. It appears that, instead of it having been completed and taken over at the time of the occurrence, as reported, the flooring and roofing had not been constructed; and somewhat less than half of the work remained to be executed. Mr. Francis says the failure in the main wall was due to a slip which took place owing to the fact that the contractor had not realized what would be the effect of the pressure of the London clay upon his incomplete and green work. Consequently, the designs were in no way at fault.

Increase in the Price of Gas at Torquay.—In consequence of the increase in the cost of coal, the price of gas to ordinary consumers, as well as to those who use it for power purposes, at Torquay is to be advanced by 2d. per 1000 cubic feet. Mr. J. Kitson, the Chairman, in making this announcement at the half-yearly meeting of the Company last Wednesday, said that the coal market was in a very unsettled state, and prices showed a tendency to go still higher. When the Company went into the market for their yearly supplies, the time was generally considered favourable; but they had nevertheless to pay nearly 20 per cent. more than last year. The half-yearly statement of accounts showed that the receipts amounted to £17,605 19s. 9d., as compared with £17,386 16s. 3d. in the corresponding half of last year; while the expenditure was £15,086, against £13,890. In order to pay the half-yearly dividends at the customary rates of 10 and 7 per cent., a sum of £3359 was required; and the profit on the half-year's working fell short of this by £840. Mr. Kitson said that, considering the increase in the cost of coal and the large expenditure on repairs and maintenance of works, the deficit was small, and the statement of accounts must be regarded as favourable.

PARKINSON'S GAS-FIRES.

NEW DESIGNS 1907-8.

The "CORAL"

With Gas and Air Adjuster.
Single Row Fuel, Registered Design.

Particulars of other New Designs on application to

PARKINSON AND W. & B. COWAN, LTD.
(PARKINSON BRANCH),
COTTAGE LANE, CITY ROAD, LONDON.
BELL BARN ROAD, BIRMINGHAM.

Increased Price at Walton-on-Thames.—The Directors of the Walton-on-Thames and Weybridge Gas Company announce that, owing to the great increase in the cost of coal, they are compelled to raise the price of gas 2d. per 1000 cubic feet as from the Michaelmas quarter.

Berlin Suburb in Darkness.—According to a telegram from the Milan correspondent of "The Tribune," Charlottenburg, the principal residential suburb of Berlin, was left last Wednesday evening without light. Owing to the burning through of the safety connection, the electric light was extinguished soon after twilight set in. Another connection was promptly installed, which, however, also burnt through immediately. Though this has happened several times in Charlottenburg, the greatest confusion ensued—the theatres, cafés, and restaurants being compelled either to close or to hurriedly instal lamps and candles.

Sales of Shares.—At the Star Hotel, Yarmouth, last Thursday, Messrs. S. Aldred and Son offered for sale, in accordance with the announcement in our advertisement columns, 150 new £30 shares (7½ per cent.) in the Yarmouth Gas Company. The Auctioneer (Mr. E. R. Aldred) gave some particulars in regard to the progress of the Company, as recently recorded in the "JOURNAL," and then invited bids for the shares, which were disposed of in half-an-hour, after brisk competition, at £50, £50 2s. 6d., and £50 5s. each. Mr. Aldred then offered an original £30 share in the Company, carrying interest at 8½ per cent. Biddings were started at £54, and the share was sold for £57 13s. 9d. At a recent sale by Messrs. Hollis and Webb, of Leeds, £1080 of "B" 7 per cent. consolidated stock of the Drighlington and Gildersome Gas Company fetched £141 10s. per £100 of stock, and 85 new shares in the same Company (£4 paid) realized £6 7s. 6d. each. On the same occasion, some £1 shares in the Royston and District Gas Company fetched £1 15s. apiece.

Large Water Scheme for Merthyr Tydfil.—For some time past, the Merthyr Tydfil Town Council have had under consideration the best means of remedying a defect in their Pentwyn reservoir, which arose from a huge fissure in the bed, originating in a fault and a drop in the strata, and extending under the dam. The Corporation have been sinking shafts in the bed of the reservoir beyond the fault, to ascertain whether suitable foundations exist for the erection of a new dam, which would impound water in a much larger area than at present. The foundations having proved satisfactory in the opinion of the Borough Engineer (Mr. T. F. Harvey), the Corporation decided to take the opinion of Mr. G. F. Deacon on the state of the reservoir and the proposals they had in view. Mr. Deacon has reported favourably upon the proposal to construct a new dam on a site which has been proved; and the Town Council have decided to ask him to prepare an estimate of the cost of the work. One member moved that the estimate be prepared by the Borough Engineer; but he withdrew his proposal on the importance being pointed out of having the estimate of one of the best engineers in the country when they went to Parliament with a scheme which would probably involve £200,000.

Incandescent Gas Lighting in Devonport Streets.—Mr. J. W. Buckley, the Gas Engineer and Manager of the Devonport Corporation, reported to the Gas Committee last week that all the street-lamps in the borough, except those in the main street, which are electric arcs, had been converted to the incandescent system. The Chairman and members of the Committee expressed themselves highly pleased with the result, and said the lighting of the town was vastly improved.

A Rise in Price at Dorking.—Addressing the shareholders at the half-yearly meeting of the Dorking Gas Company, the Chairman (Mr. Herbert Young) expressed the regret of the Directors that it had been found necessary to increase the price of gas to 4s. 2d. per 1000 cubic feet. He said there were 89 new consumers, and 71 new stoves were added to the Company's register during the past half year; while the contract for public lighting had been renewed for a further period of three years. The consumption of gas showed a slight increase. Dividends were declared at the rates of 6 per cent. on the "A," "B," and "C" shares, and 5 per cent. on the "D" shares.

The New Australian and New Zealand Tariffs.—Particulars of these tariffs have recently been published, and we take from them a few items relating to goods connected with the gas industry; the first figures being the general percentage tariff, and the second the British preferential tariff. Bolts, nuts, &c. (*ad val.*), 30, 25; cast and wrought iron pipes exceeding 4 inches diameter, 30, 25; elevating and conveying machinery, 30, 25; fittings for lighting purposes, 25, 15; gas and water meters, 30, 25; gas-stoves, 30, 20. British gas-engines go into New Zealand free under the new tariff, and so do brass tubing in the rough for gas-brackets, iron pipes and specials less than 5 inches diameter, iron sheets, angles, &c.

"M.A.P." on the Inventor of the Gas-Mantle.—The current number of the "Ironmonger" contains what it calls "an instructive example of the misleading piffle palmed off upon the unsuspecting public by contributors to the so-called 'society' papers," which was published in a recent issue of "M.A.P." The writer gave his readers the following account of the discovery of the incandescent gas-mantle: "Most great inventions have been discovered by accident, and there is a curious story of how Mr. Edison invented incandescent gas. For some reason or other, he had neglected to pay his gas bill; and an irate collector called upon him for the money. It so happened that Edison was busily engaged in working, and did not settle up at once. Shortly afterwards, to his great annoyance, the gas was cut off. This so piqued the inventor, that he there and then determined to discover something which would harm the gas companies. He set to work with a will, and the result of that night's pique was the invention of incandescent gas." Our contemporary remarks that even funnier than the attribution of Welsbach's world-famous invention to Edison is the astounding assumption that the introduction of incandescent lighting has harmed the gas companies—the result having been just the reverse; while the idea of Edison attempting to take a petty revenge by inventing in the course of one evening, with his gas supply cut off, a mantle which trebled the illuminating power of gas, is hilariously humorous.

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Automatic Lamp Lighting Suggested for Southampton.—At last Wednesday's meeting of the Southampton Town Council, the Works Committee reported correspondence with the Southampton Gas Company with respect to installing a system of automatic lighting of the gas-lamps, and recommended that the Borough Engineer be directed to ascertain the price paid in other boroughs for the lighting, cleaning, and maintenance of the public lamps; and that, in the meantime, the further consideration of lighting and extinguishing the gas-lamps of the borough automatically be deferred. Alderman Le Feuvre said the Gas Company paid for putting out the lamps; and he did not see why the Corporation should incur any expenditure for the apparatus for the benefit of the Company's shareholders. Mr. Jenvey, however, pointed out that the Alderman was wrong, and the Corporation paid. Alderman Hutchens stated that it would save fifteen or twenty lamplighters. The Committee believed there would be a great gain by adopting the system, which was at work in many other boroughs, including Portsmouth. The Committee felt they were paying more than other towns for public lighting; and they wanted to reduce the amount by saving labour. The report was adopted.

Gas v. Electricity for Public Lighting.—The current number of the "Local Government Journal" contains an article on "Progress in Gas Lighting," in the course of which the following remarks are made on the cost of gas and electricity for public lighting: "Electric lighting must rank with the luxuries of life, and must be paid for as such; gas lighting is in greater demand, is more popular, and decidedly cheaper. In various parts of London, it is found that the difference of cost is very remarkable. Take, for example, Islington, where while only 20 miles of roads were lighted by electricity at a cost of £5245, 100 miles of roads were lighted by gas at a cost of £4077. If these 100 miles of roads had been illuminated by electricity, the cost would have been £20,385. On the other hand, if the 20 miles of roads had been served with gas lighting, the cost would have been only £1049. In South London, which affords excellent specimens of local gas lighting, similar results might be quoted. In Camberwell, for instance, the street lighting costs £90 per mile annually for gas lighting, against £170 for electricity in neighbouring districts. In Deptford, the Borough Surveyor has pointed out that the cost for one arc lamp yearly would be £15, whereas five incandescent gas-lamps along a road could be maintained for this amount."

The Directors of the Kimberley Water-Works Company have declared an interim dividend of 2½ per cent. on the ordinary shares for the six months ended June 30.

According to paragraphs which appeared in the London papers on Saturday, the hands employed at the Lemberg Gas-Works, as well as the lamplighters, went out on strike the previous day.

The Directors of the Consolidated Water-Works Company of Rosario have declared an interim dividend at the rate of 6 per cent. per annum (free of tax) on the ordinary shares, for the half year ended June 30.

The Directors of the Buenos Ayres (New) Gas Company have declared an interim dividend at the rate of 6 per cent. per annum for the six months ended June 30.

The Kirton (Boston) Gas Consumers' Company has been wound up voluntarily; Mr. C. Lucas, of Boston, being the Liquidator. It is understood that the works have been sold (as a going concern) to a Cleethorpes purchaser.

The Skegness Gaslight and Coke Company have placed the order with Messrs. Robert Dempster and Sons, of Elland, for general extensions to their works, including a new retort-house roof, new retort-bench, additional purifiers, and telescoping the existing holder.

The Gas Committee of the Manchester Corporation have decided to accept the tender of Messrs. Nuttall and Co. for the construction of the tank for the gasholder which is to be erected at the Bradford Road works. The cost of the tank will be between £30,000 and £40,000, and that of the tank and holder combined not less than £100,000. The capacity of the holder will be 10 million cubic feet.

The report of the Directors of the Antwerp Water-Works Company for the six months ended June 30 shows a net profit of £24,131, compared with £24,048 for the corresponding period of last year; or, after charging special expenditure to the reserve account, an increase of £1159. The Directors have declared an interim dividend for the half year at the rate of 8½ per cent. per annum, tax free.

In the report of the Glenboig Union Fire-Clay Company for the year ended Aug. 31, it is stated that the net profits, including the balance brought forward, amount to £29,327. The Directors, after adding £5000 to the depreciation fund and £3000 to the reserve fund, recommend a dividend of 10 per cent., together with a bonus of 2½ per cent., tax free. A balance of £2577 will remain to be carried forward.

Messrs. Kirlew Brothers, Limited, send a sample of their iron and steel cement and filling; also a small button of the material "set." The powder has only to be mixed with water and left to harden for 24 hours. No heat whatever is required. When set, neither heat, oil, steam, nor water has any effect on it. It merely expands with heat and contracts the same as the metal; and it can be filed, polished, and hammered.

On Saturday, the 21st ult., a Lifeboat Procession took place in High Wycombe, to which the Gas Company sent a car laden with cooking-stoves and other utensils, which proved an attractive feature of the show. It was fitted up under the supervision of the Company's Manager and Secretary (Mr. Harold Baker); the gas arrangements being under the superintendence of Mr. Harry Jeffreys. Two cylinders supplied gas to enable the "cook" (Mr. Joe Trowbridge) to make some buns, &c., as the procession went through the streets; and we understand that about 300 were distributed. The quantity of gas used was less than 100 cubic feet. Upon the car were domestic appliances, "Bland" lights, &c., as well as various samples of coke and sulphate of ammonia.

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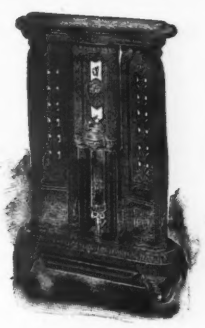

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The "Tageblatt" of Berlin publishes the following from Jena: "At the request of the Public Prosecutor, the police have arrested at Frankfurt-on-Main a Japanese engineer said to be employed at the Tokio Gas-Works, on a charge of attempting to obtain by bribery plans of the machinery at the Schott Gas-Works."

In addition to the exhibits referred to in last week's "JOURNAL," at the Engineering and Machinery Exhibition, it may be mentioned that the British Gas-Furnace and Tool Company, Limited, of Birmingham, are making a fine show of furnaces to be operated by gas, as well as of blowers and pyrometers. One furnace which is operated has an electrical apparatus attached, whereby the hardening point of any tool can be accurately ascertained. A dry battery is arranged near the furnace, connected with wires, which are attached to two pieces extending inside the furnace. These are of the same steel as that of which the tool is made, and form a magnet. In the heating of the tool, directly the recalescence takes place, the magnet ceases to act, and rings a bell, which tells the workman that the tool is at its hardening point. A pyrometer and tube are also attached to the same furnace, and give the exact temperature. Another useful furnace is shown in a high-speed steel furnace, in which can be maintained a constant temperature of 2300° Fahr. A special pipe injected in the furnace is used for lathe tools.

Messrs. Biggs, Wall, and Co., have received an order from the Quebec Gas Company for an installation of their "Rapid" retort-charging machinery.

The Wholesale Fittings Company, Limited, forward a copy of their season's list of incandescent gas fittings, accessories, &c. Close upon a hundred pages are occupied by illustrations of the goods in which the Company specialize—the "Bonbac" and "Yotto" mantles, in their various forms, having a prominent place assigned to them in the list.

A parish meeting was held at Wootton a few days ago to consider the advisability of adopting the Lighting and Watching Act. Mr. Frost, who was in the chair, explained the object of the meeting, and stated that the Parish Council had approached the Northampton Gas Company with a view to the introduction of gas into the village; but Mr. John Eunson, the Manager, had stated that there was no probability of the mains being extended to Wootton. Though he (the Chairman) was in favour of adopting the Act if gas could be procured, he was decidedly against lighting the village with oil. Mr. Smith said he should prefer gas, but oil would be better than nothing. When the question was put to the meeting, eleven voted for the adoption of the Act, and ten against. As the statutory two-thirds majority was not secured, the proposal fell to the ground.

LEAFLETS FOR DISTRIBUTION.

"ILLUMINATING TRUTHS FOR HOUSEHOLDERS."

No. 1.—"The Sanitary Aspects of Gas and Electric Lighting."
No. 2.—"The Cleanliness of Illuminants: The Eyesight."
No. 3.—"Fire Risks."
No. 4.—"The Relative Cost of Gas and Electricity, and Matters affecting it."
No. 5.—"On Reliability, with Instances of Misplaced Confidence.
No. 6.—"On Shop Lighting, with Special Reference to the Flame Arc Lamp."

This series of Leaflets will be useful, not only for distribution among Householders generally, but for circulation among Shareholders to fortify them with arguments in defence of the commodity in which they have invested capital. Copies of each Leaflet should also be kept in every Gas Undertaking's Show-Rooms.
Prices for Quantities on Application to WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

CHEMIST (RESEARCH). Leeds University. Applications by Oct. 3.
DRAUGHTSMAN. No. 4839.
FOREMAN. No. 4842.
WORKING FOREMAN. Ascot Gas-Works. Applications by Oct. 5.
RENTAL CLERK. Nuneaton Gas Company.
STOREKEEPER. Cleethorpes Gas-Works.
GAS-FITTER. No. 4841.
GAS-FITTER. Littleborough Gas-Works. Applications by Oct. 12.
MAINLAYERS. Wisbech Water Company.

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Gas Literature Wanted.

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Company Meeting.

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Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

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